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POPULATION ASSESSMENT SURVEY FOR RED KING CRAB (Paralithodes camtschatica) IN NORTON SOUND, ALASKA, 1985

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ABSTRACT

A population assessment survey was conducted for red king crab (*Paralithodes camtschatica*) in Norton Sound, Alaska from 1 to 14 July 1985. Sampling was conducted at 65 stations and 642 pots were successfully baited and retrieved representing an area of 7,052.5 km^2. The mean survey catch of red king crab per 24-hour soak was 7.2 legal width males, 9.5 sublegal males and 0.3 females. Using mark and recapture methods the population size was estimated to be 907,579 legal width male red king crab with a standard deviation of 75,033. A total of 196 tagged male red king crab was recaptured after a single molting period for the years 1981 through 1986. The mean growth per molt was 13.1 mm with a standard deviation of 3.11 mm for the 137 crabs which showed growth.

KEY WORDS: population assessment, king crab, *Paralithodes camtschatica*, Norton Sound, sampling design, gear specifications.

INTRODUCTION

A survey was conducted in July 1985 to assess the red king crab (*Paralithodes camtschatica*) population in Norton Sound, Alaska. Objectives of the survey were to:

(1) estimate abundance of legal-sized king crab (males at least 121 mm [4.75 in] in carapace width) with mark and recapture methods;

(2) obtain a survey catch per unit effort (CPUE), as measured in catch per pot lift from a 24-hour soak, to compare with an historical CPUE population size relationship;

(3) estimate the male and female length composition of the population; and

(4) monitor reproductive potential by examining female clutch fullness.

This report summarizes the results from the survey and subsequent tag recovery and growth information obtained from sampling the commercial fishery.

Because of budgetary restrictions, future crab surveys cannot be expected with any regularity, and the results from surveys to date will be needed to model and forecast future population size. Frequency of molting, growth by size category, and the relationship between length and weight are examined. Mean growth per molt, the probability of molting and the length-weight relationship were developed to predict future population levels and attendant commercial harvest goals in pounds of crab.

Description of the Study Area

Norton Sound is an eastward extension of the northern Bering Sea located entirely upon the Alaskan continental shelf and bordered by shoreline running north from the Yukon River mouth to Cape Prince of Wales. For purposes of marine fisheries resource management, the Alaska Department of Fish and Game (ADF&G) and Board of Fisheries have defined the Norton Sound Section (ADF&G 1986) to be within the Northern District of Statistical Area Q (Figure 1). The Norton Sound Section is described as all waters east of 168° W. longitude and north of the latitude of Cape Romanzof (61° 49' N. Lat.) and south of the latitude of Cape Prince of Wales (65° 36 N. Lat.).

Norton Sound is uniformly shallow (less than 50 m, 164 ft) ranging generally from 15 m (49 ft) to 30 m (98 ft). Summer water temperatures are relatively warm. Nearshore, at all depths, temperatures may reach 16° C. Bottom temperatures range from a nearshore 10°C to 1°C northeast of St. Lawrence Island (Fleming and Heggarty 1966). In contrast, the sound is covered with ice the remaining seven months of the year (November through May). During the summer the discharge of the Yukon River greatly influences the salinity of Norton Sound with readings generally less than 31 ppt but ranging from 25 near the mouth of the Yukon River to 32 ppt 24 km south of Nome. Nearshore waters were found to be 28 ppt (Fleming and Heggarty 1966).

Currents flow northward following the isobaths (Fleming and Heggarty 1966) resulting in an inshore current moving along the coastline northward from the mouth of the Yukon River. The bottom of Norton Sound is mostly gray sand and mud deposited by the Yukon River and other streams emptying into the sound (Ellison et al. 1950).

History of Exploratory Fishing and Population Assessment Surveys

Exploratory fishing was conducted in the Nome area as early as September 1948. Trawl gear was used and only blue king crab (*Paralithodes platypus*) were captured (Ellison et al. 1949). It was not until the following year when trawling was conducted further offshore and eastward of Nome that catches of red king crab were made (Ellison et al. 1950). Exploratory fishing in Norton Sound, southeast Chukchi Sea and adjacent waters was not conducted again until 1976 in response to proposed oil and gas lease sales (Wolotira et al. 1977). Red king crab were found only in northern Norton Sound overlapping little with the much wider distribution of blue king crab found in outer Norton Sound, and the Bering Straits. In general, a disjunct distribution of red and blue king crab (Figure 2) appears to exist (Somerton 1985). In support of this it was observed in 1949 that catches of red king crab were from waters greater than $2^{o}C$ and blue king crab catches were almost exclusively in waters 0° to $2.6^{o}C$ (Ellison et al. 1950).

Since 1976 the National Marine Fisheries Service (NMFS) has surveyed in Norton Sound and adjacent waters every 3 years (1979, 1982, and 1985) using an eastern otter trawl. Sampling stations in the Norton Sound area have been concentrated into a 16 k^2 (10 mi^2) grid and 30-minute tows have been conducted in the center of those squares selected for sampling (Figure 3 Stevens and MacIntosh 1986). Methodology is similar to the Eastern Bering Sea crab survey (Steven and MacIntosh 1985). Population size was estimated using the area swept method (Alverson and Pereyra 1969).

The first ADF&G population assessment survey was conducted in 1980. The survey area was restricted to northern Norton Sound based upon the results of NMFS surveys. Baited pots were fished in order to obtain an index of the population prior to commercial harvest with similar gear and a mark and recapture project was conducted to obtain a population estimate from tag recoveries by the commercial fleet. Secondary objectives of the survey were to estimate the length frequency distribution, incremental growth, movement, and probability of molting of the male population. Surveys conducted in 1980 and 1981 were reported by Powell et al. 1983. Catch by station for the 1982 survey was published in a report to the industry (ADF&G 1982a) and length frequency distributions of the male catch, population estimates and survey catches were published in ADF&G (1982b) and Schwarz (1984).

The population size of legal red king crab in Norton Sound, as estimated by research surveys, has varied from 3 million crabs in 1976 to 350 thousand in 1982 (Table 1). The decline in the number of legal size male crab from 1976 through 1982 has been attributed to a lack of recruitment and removal of the older crab by the commercial fishery (ADF&G 1984). This decline occurred in the absence of such sources of mortality as nemertean worms of the genus *Carcinomemetes* which prey on eggs (Wickham et al. 1985) or epidemic proportions of the microsporidan disease (C.F. Lean, ADF&G, personal

communication) commonly referred to as the "cottage cheese disease" (Sparks and Frank 1985).

Population estimates of sublegal male crab were not made from ADF&G surveys as these crabs are thought to be less vulnerable than adults to capture by pots. Additionally, the surveys were not designed to assess female abundance and few females were captured. The female population was thought to be distributed more inshore. As a consequence, the variation among years was assumed not to reflect any trend in female abundance.

METHODS

Gear Specifications

The department's king crab pots used in 1985 were developed for research surveys and differed from those used commercially in that they were covered with a smaller 8.9 cm (3.5 in) stretch mesh. Each pot was fitted with two tunnel eyes with vertical and horizontal measurements of 20 cm x 91 cm (8 in x 36 in) respectively, weighed approximately 295 kg (650 lb) and measured 2.1 m x 2.1 m x 76 cm (7 ft x 7 ft x 30 in). Each pot was baited with two, one liter (1 qt) containers filled with recently thawed and chopped herring. A commercial vessel rigged for king crab fishing and an experienced crew were chartered to bait, deploy, and retrieve gear.

Survey Design

Initially the department's decision to survey only northern Norton Sound for red king crab was based on the success of exploratory fishing and NMFS assessment surveys in describing a fairly consistent and confined distribution of red king crab within the northeastern Bering Sea area. Furthermore, a commercial crab fishery, begun in 1977, targeted on the area and did not disperse into nor discover any additional areas of crab concentration. A grid system of stations was established in 1980 by Powell et al. (1983) for Norton Sound (Figure 4). Stations were placed at intervals of 6 minutes latitude (11.1 km) in the north-south direction and 20 minute intervals in the east-west direction which is 16.2 km at 64^0 north latitude (Dunlap and Schufeldt 1975). Each station was assumed to be four minutes in length and only one crab pot wide. Because of the staggered pattern of station placement the area each station represented was estimated by centering a station in its own rectangle which was 6 minutes wide and 12 minutes long, resulting in a grid pattern of rectangles each 108.5 km^2. The choice of stations to survey in 1985 was based on historical performance. The highest priority was given stations that had been sampled in all previous years and had resulted in a consistently non-zero catch (Appendix Table 1, 2). Thereafter the priority decreased with a decrease in either the number of years sampled or the presence of crab. Special emphasis was given to several inshore stations that had never been fished in order to expand our understanding of migrational movements and to evaluate a theorized spring offshore movement of crab. The loran location and latitude/longitude for stations previously sampled are presented in Appendix Table 3.

A survey was designed for 16 days of fishing or 15 days of pot retrieval with the first being used to initially deploy gear. Stations to be fished each day were chosen to create a circular pattern such that after the pots were set the vessel would have returned to the position needed to retrieve the first string of pots placed that day. In addition the survey began with stations nearest to Nome working westward and then south in order to sample in the direction of the theorized offshore migration of crab. By so doing it was hoped that crab could not migrate into an area already sampled and therefore not be vulnerable to capture. A string of 10 pots were set at 0.4 km intervals (0.25 mi) generally in an east to west direction at each of five stations per day.

Each pot's catch was standardized to represent a catch from a 24-hour soak through the following transformation:

$$C = c \ 24 / S$$

where:

  C = CPUE (Standardized Catch for a 24-hour soak)

  c = Actual catch (unstandardized)

  S = Soak time, which is the difference between time set and retrieved.

Sampling Design

Each pot's catch was processed onboard following the procedures described in the operational plan (Schwarz and Brannian 1985). King crab were sorted by species, sex, and legal versus sublegal size. Legal crab were defined (See 5 AAC 34.060b, ADF&G 1986) as male red king crab with carapace width greater than or equal to 121 mm (4.75 in). The width measurement was defined by ADF&G (1986) as the straightline distance across the carapace at a right angle to a line midway between the eyes to the midpoint of the posterior portion of the carapace and including the spine. Carapace length was defined as the straight-line distance between the extreme concavity of the right eye orbit and the midpoint of the posterior portion of the carapace. Carapace length was measured to the nearest mm (using Vernier calipers) for all male crab and shell condition (age) categorized as either new, old or very old depending on the presence and abundance of scratches and epiflora and fauna. Shells were considered new if it had been 1 to 12 months since molting as judged by the absence of scratches on the underside and lack of development of epiflora and fauna. Shells were considered old if it had been 13 to 23 months since molting and there existed a moderate level of scratches on the underside and a moderate presence of epiflora and fauna on the carapace. Shells were considered very old with advanced stages of epiflora and fauna growth on the carapace and a heavily scratched underside. Weights to the nearest sixteenth of an ounce were taken using a balance scale on a subsample of legal male red king crab. Carapace length was recorded for all female crab. Females were categorized according to the relative fullness of their clutch. The catch incidental to king crab was counted by taxon. Carapace width measurements were taken on all Tanner crab (*Chionoecetes* spp.) and total length recorded for all finfish.

Data were analyzed using a series of FORTRAN programs developed by Department staff in Kodiak. These programs were used to calculate mean soak time, mean station depth and CPUE by station and length frequency data. A final classification of the male catch was based on historical data (Powell et al. 1983) for the following length categories of legal and sublegal crab:

Sublegal male crab:

  Prerecruit-ones were sublegal crab of at least 90 mm in carapace length

  Pre-ones were sublegal crab less than 90 mm in carapace length

Legal crab:

  Recruits were newshell legal crab through 115 mm in carapace length

  Postrecruits were all other legal males.

Mean Catch Per Pot and Its Variance

Mean catch per pot and its variance were calculated for the survey based on a stratified systematic sampling design which treated the calculation of stratum means and variances as a two- stage sampling problem. Stations were designated as primary units and pots were subunits for the two-stage sampling within an area stratum. Stations were sampled in a systematic manner. Strata were selected using a post-stratification scheme which minimized within stratum variance through grouping stations of similar catches. This procedure was used to calculate means and variances for catch and CPUE for each of three crab categories (legal males, sublegal males and females).

The methods of Wolter (1984) and Cochran (1977) were followed in obtaining station and stratum statistics. The mean catch per pot (or CPUE) within station i (Y_{ih}) and the overall mean catch (or CPUE) per stratum h (Y_h) were calculated as:

$$(1) \qquad Y_{ih} = m_{ih}^{-1} \sum_{j=1}^{m_{ih}} Y_{ijh}$$

$$(2) \qquad Y_h = n_h^{-1} \sum_{i=1}^{n_h} Y_{ih}$$

where: Y_{ijh} = number of crab caught in pot j at station i in stratum h

         m_{ih} = number of pots at station i of stratum h

         n_h = number of stations in stratum h

An unbiased estimator of the variance in Y_h was the sum of two variance components:

$$(3) \qquad Var(Y_h) = S_{1h}^2 + S_{2h}^2$$

The first was the variance among station means (S_{1h}^2) and was estimated as:

$$(4) \qquad S_{1h}^2 = \sum_{i=1}^{n_h} (Y_{ih} - Y_h)^2 / n_h(n_h - 1)$$

The second component (S_{2h}^2) corresponds to the variance among pots within stations averaged over all stations and was estimated as:

$$(5) \qquad S_{2h}^2 = n_h^{-2} \sum_{i=1}^{n_h} Var(Y_{ih})$$

$$(6) \qquad Var(Y_{ih}) = \sum_{j=2}^{m_{ih}} (Y_{ijh} - Y_{i,j-1,h})^2 [2\ m_{ih}(m_{ih}-1)]^{-1}$$

where: j = pot order and represents adjacent pots.

Within-station variance, Var (Y_{ih}) was calculated using equation 6 because of Wolter's (1984) finding that this estimator partially protects against bias that can be caused by population patterns, such as autocorrelation, linear trends, and others. Equation 5 requires am assumption of independence between the catches at each station. This survey's scale of inter-station spacing, less than 11 km in Norton Sound, may lead to the violation of that assumption if aggregation patterns exist that extend beyond that distance.

Finally, formulae for stratified systematic sampling (Cochran 1977, p. 226-227) were used to estimate the mean catch per pot among the strata Y_{stsy}, and its variance, $Var(Y_{stsy})$:

$$(7) \qquad Y_{stsy} = \sum_{all\ h} W_h Y_h$$

and

$$(8) \qquad Var(Y_{stsy}) = \sum_{all\ h} W_h^2 Var(Y_h)$$

where: W_h = Proportion of total area surveyed in stratum h

Three or four strata were chosen using a post-stratification scheme which minimized the coefficient of variation in Y_{syst}. Stations with zero catches comprised the first stratum. Boundaries for the other strata were identified by trial and error.

Probabilities of Obtaining Legal Sized Males Based on Carapace Length Measurements

King crab do not possess a unique carapace length measurement corresponding to the minimum legal carapace width measurement of 121 mm. Carapace length is the scientifically accepted measurement; having been precisely defined, it is thought to be more repeatable and less susceptible to error than a carapace width measurement. Furthermore, surveys conducted by NMFS collect only carapace length data. It is therefore necessary to understand the relationship between carapace length and width dimension in order to determine which portion of the population is legal for harvest for the years when only NMFS has assessed the area.

Probit analysis (Hewlett and Plackett 1979) was used to estimate the probability of a crab having a legal width measurement based on its carapace length. Probit analysis was also utilized to fit a sigmoid curve to data concerning the probability of obtaining a legal size width measurement for a given length category. SAS (1985) software on the state of Alaska IBM mainframe was utilized to obtain the maximum likelihood estimates for A and B > 0

$$Z^{-1}(y) + 5 = A + Bx$$

where: Z = cumulative distribution function of the standard normal distribution

x = carapace length

y = probability of being of legal width

The probabilities for the estimated curve were obtained using a polynomial expression given by Hastings (1955).

Length-Weight Relationship

Population abundance was estimated in number of crab by both the department and NMFS. In contrast, harvest guidelines were set in pounds of legal size crab. A length-weight relationship was needed to convert numbers of crab to biomass in order to set harvest guidelines and forecast allowable catch.

The length (L) weight (W) relationship for Norton Sound red king crab was modeled as $W = aL^b$. A log transformation was made to collected length and weight data. The regression subroutine in Minitab for microcomputers (Ryan et al. 1986) was used to obtain a least squares fit of the data to the linearized form of the model.

Growth per Molt and Probability of Molting

Legal and sublegal male red king crab have been tagged and released during each of the department's population assessment surveys (1980, 1981, 1982 and 1985) in Norton Sound. In addition when pots were fished directly offshore from Nome during the winters of 1982 through 1986 male king crab were tagged and released (Schwarz 1983, Schwarz and Lean 1984). At the time of release crab were measured for carapace length and the number of months since molting was estimated from the condition of the shell. Subsequently, tagged crab recovered a year later were again measured and age of shell recorded as the number of months since molting. In general shells were considered new if it had been 1 to 12 months since molting, old shells were 13 to 23 months and very old shells designated greater than 24 months. Growth per molt was estimated from recovered tagged crab that had been at large during only one molting period and showed significant growth. Growth of less than 3 mm was thought to be due to measurement error as were negative changes in size between release and recapture. Probabilities of molting by size category were estimated as the ratio of crabs recovered after one molting period that had grown to the total number recovered. Powell et al. (1983) had earlier concluded that Norton Sound male red king crab molted during April through June, prior to the department's assessment surveys in July. This was based only on judgements concerning the shell condition during July surveys. The population has been sampled during the department's winter research program from January into May beginning in 1982 and has not documented molting crab. The only observed occurrence of molting male crab in Norton Sound has been from late August through September (C.F. Lean, ADF&G, personal communication) by the commercial fleet (1982) and NMFS (1982 and 1985). NMFS has documented the presence of molting red king crab in September during their 1982 and 1985 survey in Norton Sound (Stevens and MacIntosh 1985). Therefore it is now generally believed that the molt occurs from late August to October for male red king crab in Norton Sound. In contrast, female red king crab are still thought to molt in March through May.

Petersen Population Estimate - Tag Placement and Recovery

The abundance of legal male red king crab in Norton Sound has been estimated with mark and recapture methods. Crabs were tagged and released during the population assessment survey and recovered by onboard observers employed by the department during the commercial fishery. Initially every legal sized male crab was to be tagged with a permanent isthmus tag developed by Powell et al. (1983) consisting of a stainless steel hog ring with uniquely numbered Floy tubing. Secondary objectives for tagging included obtaining estimates of incremental growth, yearly probability of molting, and to describe the spring migration. Every tenth sublegal crab was tagged because of their greater abundance and the fact that a population estimate of sublegals was not an objective of the survey.

To obtain the most accurate Petersen population estimate, only tagged crab recovered by department observers were used to construct the estimate. Crab were measured and the location information used to determine the research area of recovery. Norton Sound has been subdivided into a rectangular grid system by Powell et al. (1983) for the collection and analysis of tag return data (Figure 5). Rewards were paid to vessel crewmembers regardless of whether the vessel had an observer. Only data collected by department

observers concerning number of recovered tags and crab observed for tags (vessel's catch) were used in the Petersen population estimate.

Population size was estimated using an adjusted Petersen estimator (Seber 1982). The legal male king crab population (N) was calculated as:

$$N = \frac{(C+1)(M+1)}{(R+1)} - 1$$

and its variance (S^2) estimated as (Seber 1982):

$$S^2 = \frac{(C+1)(M+1)(C-R)(M-R)}{(R+1)(R+1)(R+2)}$$

where:

M = number of crab tagged
C = number of crab observed for tags
R = number of crab recovered with tags

The size of the prerecruit population (N_S) vulnerable to capture was estimated from the size distribution of the survey's male catch and the population estimate (N) of legals. The estimate was calculated as:

$$N_S = N / P$$

where:

P = proportion of total charter CPUE that was sublegal

Using the delta method (Seber 1982) the variance [$V(N_S)$] was approximated as:

$$V(N_S) = S^2 / P^2 + N^2 V(P) / P^4$$

where:

$V(P) = P(1-P)/(n-1)$ is the variance of P and n is the number of male crab measured during the survey

RESULTS

The F/V Arctic Sea, a 38 m (125 ft) vessel rigged for commercial crab fishing was chartered for 14 days beginning July 1, 1985. Sampling was conducted at 65 stations (Figure 6) and 642 pots were successfully baited and retrieved representing an area of 7,052.5 km^2. The mean depth per station ranged from 15.5 m to 28 m with coefficients of variations from 0 to 15% (Table 2). The mean soak time per station varied from 9.2 hours to 24.9 hours.

All catches of king crab were standardized to represent CPUE for a potlift with a 24-hour soak. The total standardized catch for the 1985 population

assessment survey was 6,086 sublegals, 4,645 legal males (Appendix Table 4) 40 juvenile and 141 adult females (Appendix Table 5). Station's mean catch per pot ranged from zero to 34 (Figure 7). Standardized catches of blue king crab and unstandardized catches of incidental crab and finfish species are presented by station in Appendix Tables 6 and 7.

The mean CPUE and its variance for the survey were calculated using standardized catch per pot lift. Data were poststratified into four strata (zero, and three non-zero strata). The non-zero stratum boundaries were 0.10 - 4.9, 5 - 19.9 and 20 - 34 for legal male standardized catch and CPUE and 0.10 - 4.9, 5 - 26 and 26.5 - 50 for sublegal male standardized catch and CPUE. The resulting mean standardized catch per pot lift and its variance are presented in Table 3. The mean and its variance were also calculated for unstandardized catch (Table 3). The ratios of the standard error to the mean were virtually identical between CPUE and raw catch.

Length Composition, Weight, Shell Condition, and Ovigerity

In 1985 all male king crab captured were measured for carapace length after having been designated legal or sublegal from its carapace width measurement. Figure 8 (Appendix Table 8) illustrates the length-frequency distribution of male crab captured during the assessment survey. Based on carapace measurement and shell condition 57% were judged to be prerecruits, 17% recruits and 26% postrecruits. Ninety-nine percent of the sublegals and 87% of the legals captured were judged to be in new shell condition, and therefore to have molted in the fall of 1984.

Probit analysis (Hewlett and Plackett 1979) was used to fit a sigmoid curve to 1985 (Figure 9) carapace length data. Data in 2-mm length categories were used within the size range where less than 100% were legal or sublegal based on width measurement. Male crabs ranging from 96 to 111 mm in carapace length were not all legal size. For 1985 only 14.3% of the 101-mm length crabs were legal increasing to 92.7% of the 107-mm length crabs (Table 4). Appendix Table 9 presents the results of probit analysis using data of previous surveys conducted in 1980 and 1981.

A total of 472 legal male crab was weighed and measured during the survey and an additional 213 males during the winter of 1985-1986. A length-weight relationship was fit to these data (Figure 10). Using a linearized form of the model ($W=aL^b$), a least squares fit was able to explain 97% (R^2) of the variation in weight by carapace length of the transformed data (Table 5).

All female king crab captured were measured and categorized according to the presence of and relative size of the egg clutch (ovigerity). Figure 11 illustrates the size composition of the catch. Of those captured 22% were juveniles and 4% were large adults that had never borne eggs. Sixty-two percent had clutches greater than 89% full (Appendix Table 10). Sixty four percent of the female crab ranging from 60 to 75 mm in carapace length were adults. Probit analysis was used to estimate the percent adult by length category (Table 6, Figure 12).

Length frequency composition of blue king crab and Tanner crab are presented in Appendix Tables 11 and 12.

Tagging and a Petersen Population Estimate

A total of 1,514 legal male and 542 sublegal male red king crab was tagged and released during the 1985 population assessment survey. Every legal crab captured at the nearshore stations numbered 574 and 592 was tagged and every third legal crab was tagged at all subsequent stations. However, for purposes of the Petersen population estimate, only every third tag released at stations 574 and 592 was considered a mark resulting in a total of 1,175 tagged legal males.

Recovery of tagged crab was accomplished through the inspection of the commercial catch. The season opened August 1 with six boats participating, two catcher-processors and four catchers delivering to one processor. Four department employees were onboard vessels to observe the catch for tagged crab. A total of 99,555 crabs was examined for tags by department staff, of which 128 carried tags qualifying for the Petersen estimate. The population estimate was 907,579 legal crabs with a variance of 5.63 million (Table 7). An estimate of 1.6 million sublegal crabs of a size vulnerable to capture by research gear was made with a variance of 17.7 million (Table 7).

Growth per Molt and Probability of Molting

A total of 196 tagged crabs was recaptured after a single molting period for the years 1981 through 1986. The mean growth per year was 13.1 mm with a standard deviation of 3.11 for the 137 crabs displaying growth. A total of 59 was skipmolt crab or crab which had not grown (Table 8). There appeared to be a slight decrease in growth per molt with increasing carapace length. This decrease in mean growth per molt may have been more a function of small sample sizes in the larger length categories (Figure 13).

The probability of molting after one year decreased with increasing carapace length. One hundred percent of those crab less than 95 mm in carapace length molted. In contrast only 23% of the crab larger than 130 mm molted after one year.

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Table 1. Results of the population assessment surveys conducted for red king crab in Norton Sound since 1976.

Year	Date	Research Agency	Gear/ Vessel	Effort	Number of Red King Crab Captured [1]			Population Estimates [3] of Legal Male crab	
					Sublegal Males	Legal Males[2]	Females	Numbers	Pounds
1976	9/02 - 9/05 9/16 -10/07	NMFS	Miller- Freeman	Trawl 158 Tows	768	555	180	3,119,800	8,111,480
1979	7/26 - 8/05	NMFS	Miller- Freeman	Trawl 71 Tows	46	194	40	837,241	2,511,723
1980	7/04 - 7/14	ADF&G	Altair	Pots 397 Lifts	443	3,290	158	1,900,000	6,600,000[4]
1981	6/28 - 7/14	ADF&G	Altair	Pots 718 Lifts	4,097	3,415	1,933	1,285,195	4,755,221
1982	7/06 - 7/20	ADF&G	Aleutian #1	Pots 689 Lifts	5,019	2,001	424	353,273	1,271,783
1982	9/05 - 9/11	NMFS	Miller- Freeman	Trawl 50 Tows	322	107	265	970,646	2,620,744
1985	7/01 - 7/14	ADF&G	Arctic Sea	Pots 642 Lifts	6,086	4,645	181	907,579	2,414,644
1985	9/16 -10/01	NMFS	Argosy	Trawl 78 Tows	266	163	151	1,203,000	3,369,000

[1] Number of crab captured on ADF&G surveys represent data standardized for a 24-hour soak.

[2] Legal male red king crab were defined as at least 106 mm in carapace length for the 1976 NMFS survey; 105 mm for the 1979 and 1985 NMFS survey; and at least 121 mm in carapace width for all ADF&G surveys.

[3] Population estimates are valid for the date of the survey, i.e., either before or after the summer commercial fishery.

[4] The 1980 estimate has been revised from the original estimate of 13.4 million pounds. The original estimate was thought inaccurate due to under-reporting of recovered tagged crab.

Table 2. Number of pots per station, mean station depth, and soak time for the 1985 ADF&G Norton Sound red king crab population assessment survey.

| Station | No. of Pots | Depth in Meters | | | | Mean (Hrs) Soak Time | Soak CF [1] |
		Mean	SE	CV	Min. - Max.		
439	10	26.9	0.39	4.6	25.6 - 29.3	19.2	1.25
440	8	27.2	0.23	2.4	25.6 - 27.4	20.1	1.19
441	9	24.4	0.30	3.8	23.8 - 25.6	20.9	1.15
442	10	24.9	0.30	3.8	23.8 - 25.6	14.1	1.70
443	10	27.1	0.24	2.8	25.6 - 27.4	14.5	1.66
444	10	28.0	0.28	3.2	27.4 - 29.3	18.2	1.32
464	10	27.4	0.00	0.0	27.4 - 27.4	16.7	1.44
465	8	23.8	0.00	0.0	23.8 - 23.8	16.0	1.50
466	10	21.9	0.00	0.0	21.9 - 21.9	13.2	1.82
467	10	22.7	0.30	4.2	21.9 - 23.8	15.2	1.58
468	10	24.3	0.28	3.6	23.8 - 25.6	14.8	1.62
469	10	26.7	0.30	3.5	25.6 - 27.4	18.5	1.30
495	10	27.1	1.30	15.2	21.9 - 32.9	17.4	1.38
496	10	25.6	0.00	0.0	25.6 - 25.6	19.7	1.22
497	10	21.6	0.24	3.6	20.1 - 21.9	20.4	1.18
498	10	20.1	0.00	0.0	20.1 - 20.1	17.6	1.36
499	10	20.1	0.00	0.0	20.1 - 20.1	18.8	1.28
500	10	21.9	0.00	0.0	21.9 - 21.9	17.8	1.35
517	10	23.2	0.28	3.8	21.9 - 23.8	16.8	1.43
518	10	16.6	0.18	3.5	16.5 - 18.3	15.8	1.52
519	10	20.1	0.00	0.0	20.1 - 20.1	21.6	1.11
520	10	19.2	0.30	5.0	18.3 - 20.1	20.4	1.18
521	10	19.2	0.30	5.0	18.3 - 20.1	19.6	1.22
522	10	20.3	0.18	2.8	20.1 - 21.9	17.0	1.41
523	10	22.3	0.24	3.5	21.9 - 23.8	18.9	1.27
537	10	23.6	0.18	2.5	21.9 - 23.8	10.5	2.29
538	10	22.3	0.24	3.5	21.9 - 23.8	11.1	2.16
539	10	17.7	0.28	5.0	16.5 - 18.3	11.6	2.07
540	10	18.3	0.00	0.0	18.3 - 18.3	15.0	1.60
541	10	18.3	0.00	0.0	18.3 - 18.3	15.9	1.51
542	10	18.3	0.00	0.0	18.3 - 18.3	18.7	1.28
543	10	19.0	0.30	5.0	18.3 - 20.1	17.9	1.34
544	10	20.1	0.00	0.0	20.1 - 20.1	18.5	1.30
557	9	26.6	0.44	5.0	25.6 - 29.3	9.5	2.53
558	10	18.1	0.18	3.2	16.5 - 18.3	9.2	2.61
559	10	18.3	0.00	0.0	18.3 - 18.3	18.0	1.33
560	10	16.5	0.00	0.0	16.5 - 16.5	17.5	1.37
561	10	17.2	0.30	5.5	16.5 - 18.3	16.9	1.42
562	10	17.6	0.30	5.4	16.5 - 18.3	19.8	1.21
563	10	18.3	0.00	0.0	18.3 - 18.3	19.3	1.24
564	10	18.3	0.00	0.0	18.3 - 18.3	19.0	1.26
574	10	15.5	0.49	10.0	12.8 - 18.3	18.0	1.33
575	10	24.9	0.30	3.8	23.8 - 25.6	24.9	0.96
576	10	16.5	0.00	0.0	16.5 - 16.5	24.0	1.00
577	10	16.5	0.00	0.0	16.5 - 16.5	16.9	1.42
578	10	16.5	0.00	0.0	16.5 - 16.5	18.6	1.29
579	10	16.5	0.00	0.0	16.5 - 16.5	18.7	1.28
580	9	16.5	0.00	0.0	16.5 - 16.5	17.7	1.36
592	10	21.8	0.64	9.2	20.1 - 25.6	22.2	1.08
593	10	18.3	0.00	0.0	18.3 - 18.3	23.7	1.01
594	9	15.6	0.32	6.2	14.6 - 16.5	17.7	1.36
595	10	16.5	0.00	0.0	16.5 - 16.5	18.0	1.33
596	10	16.5	0.00	0.0	16.5 - 16.5	19.6	1.22
608	10	16.5	0.00	0.0	16.5 - 16.5	19.7	1.22
609	10	16.5	0.00	0.0	16.5 - 16.5	20.1	1.19
618	10	16.5	0.00	0.0	16.5 - 16.5	16.6	1.45
627	10	18.3	0.00	0.0	18.3 - 18.3	17.5	1.37
637	10	20.1	0.00	0.0	20.1 - 20.1	18.0	1.33
646	10	19.8	0.24	3.9	18.3 - 20.1	18.4	1.30
656	10	16.5	0.00	0.0	16.5 - 16.5	18.9	1.27
657	10	18.3	0.00	0.0	18.3 - 18.3	18.4	1.30
666	10	20.1	0.00	0.0	20.1 - 20.1	17.5	1.37
667	10	18.3	0.00	0.0	18.3 - 18.3	19.1	1.26
696	10	22.7	0.30	4.2	21.9 - 23.8	19.8	1.21
705	10	25.1	0.28	3.5	23.8 - 25.6	20.7	1.16
Total 65	642						

[1] SE = Standard error of the mean
CV = Coefficient of variation in percent
Soak CF = Soak correction factor = 24 Hrs / Mean Soak Time
     Standardized catch is Soak CF times the observed catch.
Source = Worksheet Potdepth.wk1

Table 3. Mean and its variance for CPUE and unstandardized catch in number of crab from the 1985 ADF&G red king crab population assessment survey in Norton Sound.

Red King Crab	CPUE (Standardized Catch)		
	Mean	Variance	R.E.[1]
Legal	7.2	0.17	5.7
Sublegal	9.5	0.52	7.6
Females	0.3	0.002	14.4

Red King Crab	Unstandardized Catch		
	Mean	Variance	R.E.
Legal	5.5	0.10	5.7
Sublegal	7.2	0.28	7.3
Females	0.2	0.0009	14.6

[1]R.E. = Relation percent error or the ratio of the standard error to the mean in percent.

Table 4. Percent of male red king crab that were legal size for carapace
lengths 95 to 112 mm, Norton Sound, 1985.

Carapace Length (mm)	Percent[1] Legal
95	0.0
96	0.1
97	0.3
98	1.0
99	2.8
100	6.8
101	14.3
102	25.8
103	41.0
104	57.7
105	73.0
106	84.9
107	92.7
108	97.0
109	98.9
110	99.7
111	99.9
112	100.0

[1] Legal crab are males of at least 121 mm (4.75 in) in
carapace width.

Table 5. Regression summary (weight on length) for the relationship between weight (in g) and carapace length (in mm) of male red king crab in Norton Sound.

Variable[1]	Estimate of Coefficient	Standard Error
Intercept	-2.88	0.04
Slope	2.89	0.02

$R^2 = 0.97$, S.E.$= 0.032$, d.f.$= 683$

[1]Model used as LN(Weight) = Ln(a) + b Ln(Length).

Table 6. Percent of female red king crab which were adults for carapace
lengths 60 to 75 mm in Norton Sound, 1985.

Carapace Length (mm)	Percent Adult
60	0.1
61	0.4
62	1.1
63	3.1
64	7.2
65	14.8
66	26.3
67	41.2
68	57.6
69	72.7
70	84.5
71	92.3
72	96.7
73	98.8
74	99.6
75	99.9

Table 7. Estimate of population size in numbers and its standard deviation for the red king crab population in Norton Sound, 1985.

Male King Crab	Proportion of Catch	Population Size	Standard [1] Deviation
Legal	0.43	907,579	75,033
Sublegal	0.57	1,600,668	133,021

[1]Square root of the variance.

Table 8. Growth per molt (in mm) and percent molting for Norton Sound red king crab tagged from 1980 through 1985 and recovered one year after tagging[1].

Carapace Length (mm)	Growth After One Molt (mm)			Number of Skipmolts	Pecent Molting	Total No. Recoveries
	Mean	STD	N			
65 - 69	12.00	1.00	1	0	100.0	1
70 - 74	15.00	1.00	1	0	100.0	1
75 - 79			0	0	100.0	0
80 - 84			0	0	100.0	0
85 - 89	15.50	3.54	2	0	100.0	2
90 - 94	14.36	3.29	11	0	100.0	11
95 - 99	15.15	3.48	26	1	96.3	27
100 -104	13.69	2.87	26	5	83.9	31
105 -109	13.18	3.16	17	7	70.8	24
110 -114	11.60	2.00	10	5	66.7	15
115 -119	11.92	2.61	12	3	80.0	15
120 -124	11.05	2.12	19	11	63.3	30
125 -129	12.00	2.85	5	3	62.5	8
130 -134	10.00	1.00	3	13	18.8	16
135 -139	11.50	2.00	4	9	30.8	13
140 -144			0	2	0.0	2
Total	13.10	3.11	137	59		196

[1]STD = Standard Deviation
  N = Number recovered having molted and grown
 Source = Lotus worksheet GROWTHS.WK1
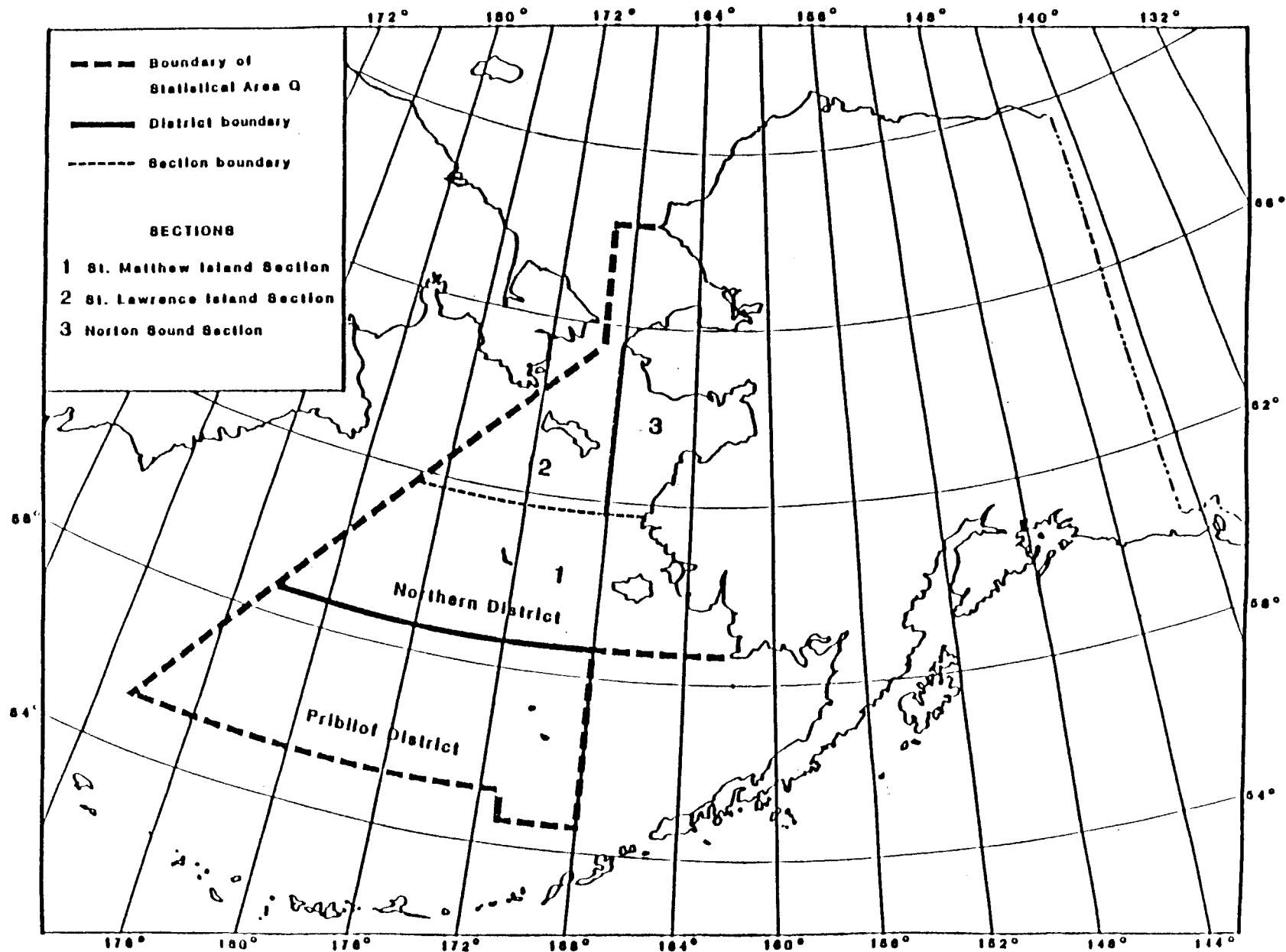
Figure 1. King crab fishing districts and sections of Statistical Area Q.
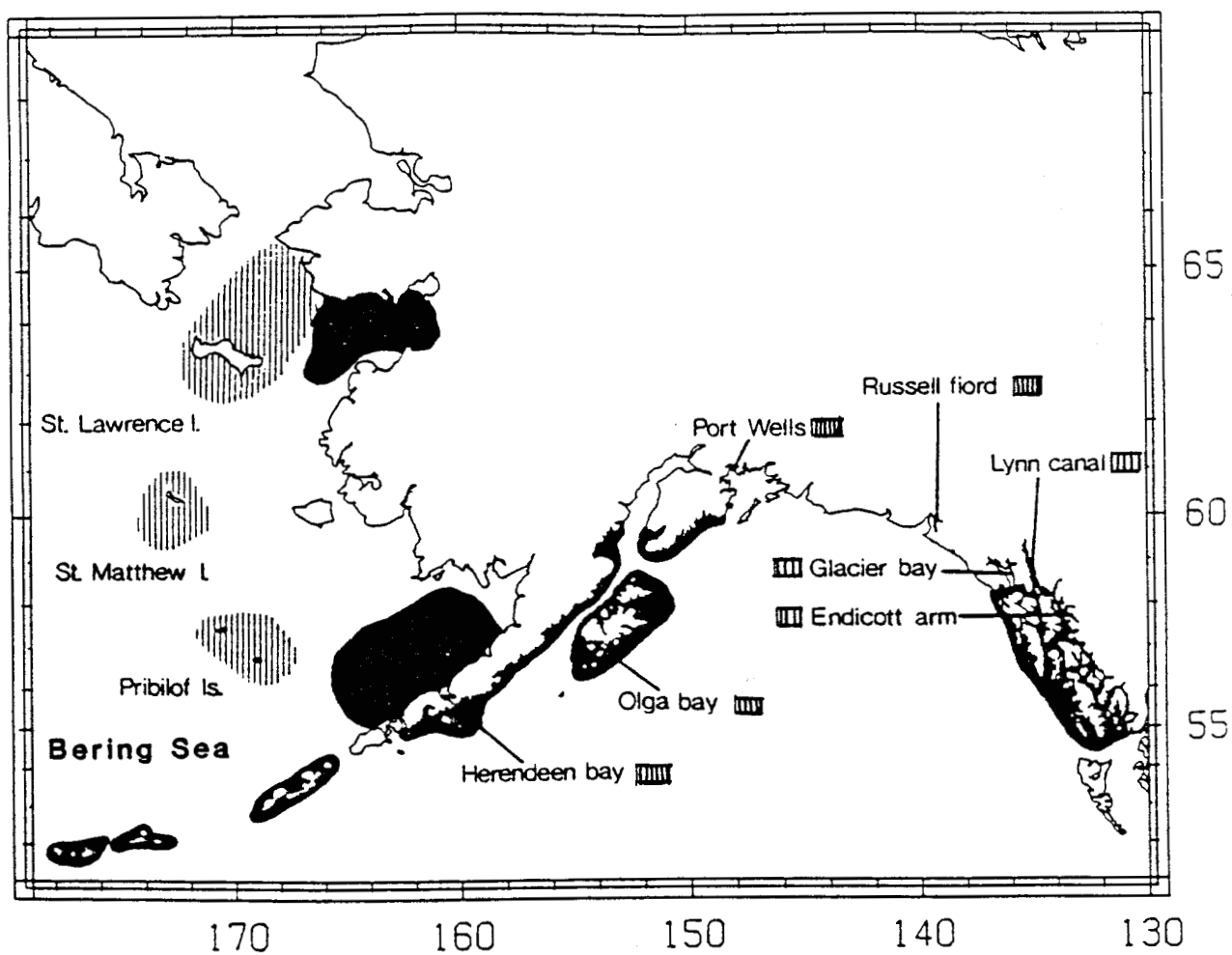
Figure 2. The distribution of red king crab (solid dark) and blue king crab (slashed lines with location names) in Alaska based on Somerton (1985).
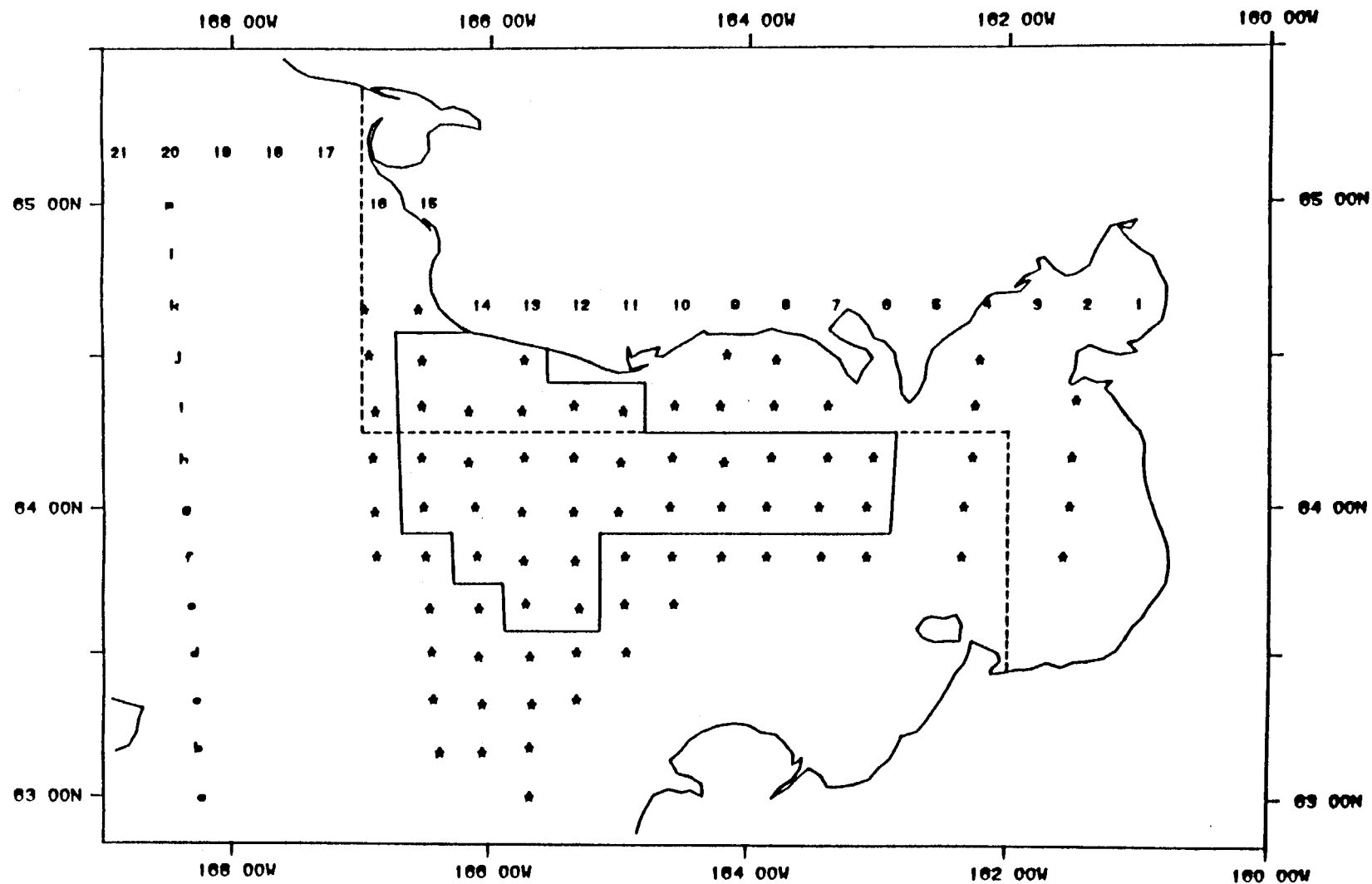
Figure 3. Location of stations sampled by NMFS Norton Sound, 1985. The stars designate the center of those stations sampled and the placement of trawl gear. The area enclosed by solid lines was surveyed by the Department in July 1985. A dotted line separates areas open and closed (inshore) to commercial fishing. (From Stevens and MacIntosh 1985).
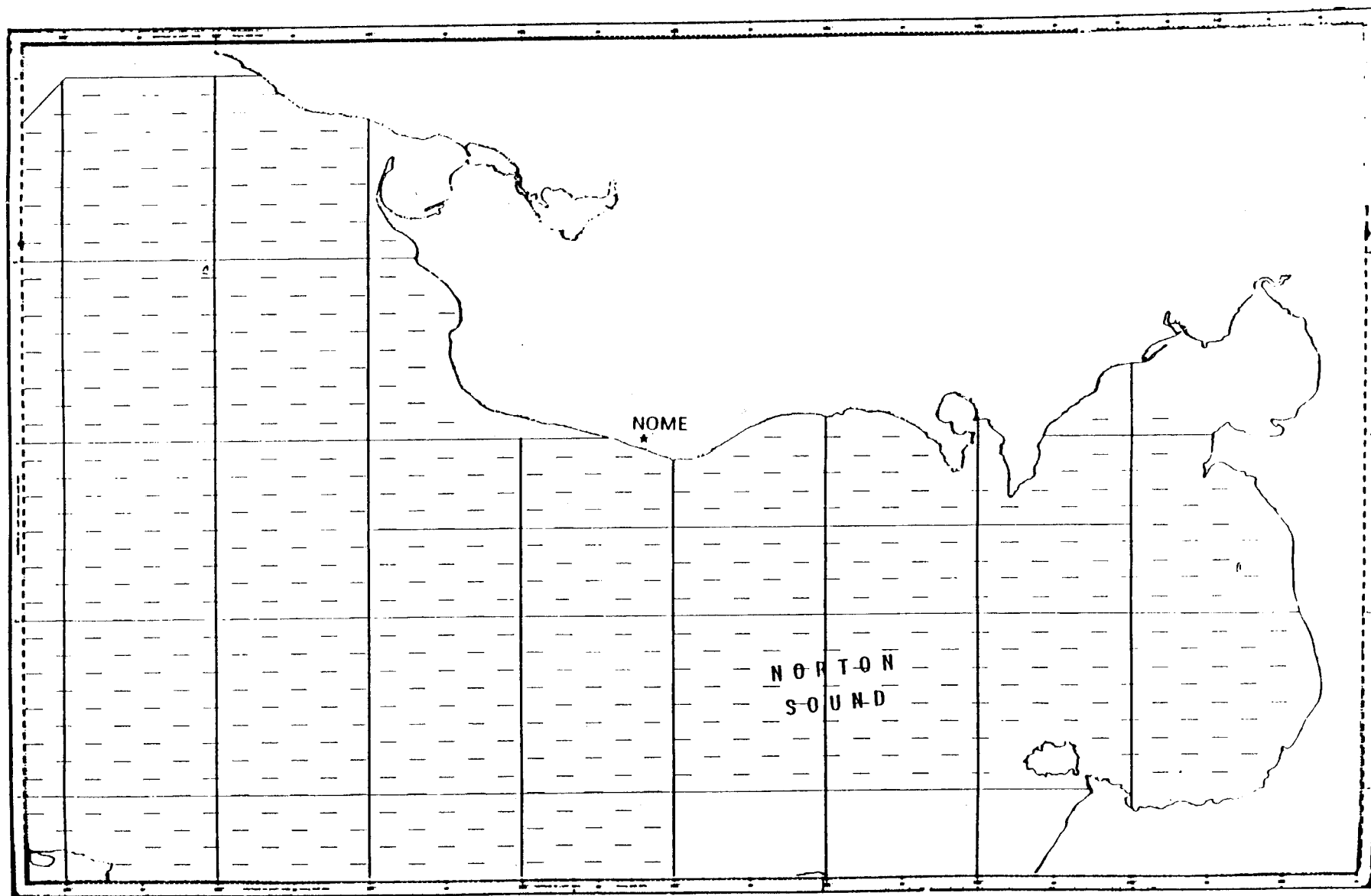
Figure 4. Systematic placement of all possible king crab research fishing stations for Norton Sound and adjacent waters, Alaska. Each horizontal line represents a possible station. (From Powell et al. 1983)
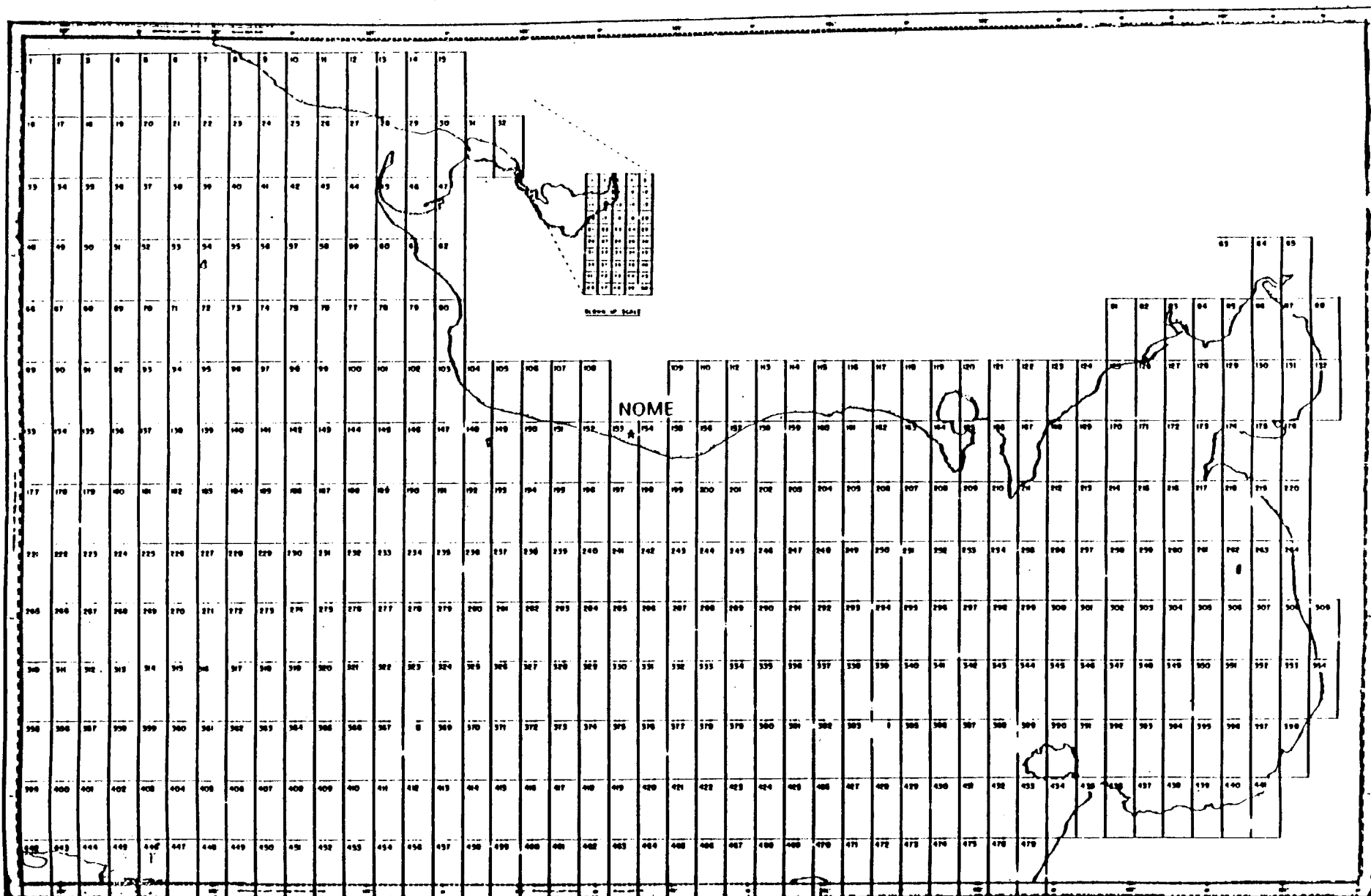
Figure 5. Research grid system for recording tag recoveries consisting of 8-by 16-km (5-by 10-mi) rectangles each of which were subdivided to 50 squares (1 mi). (From Powell et al. 1983)
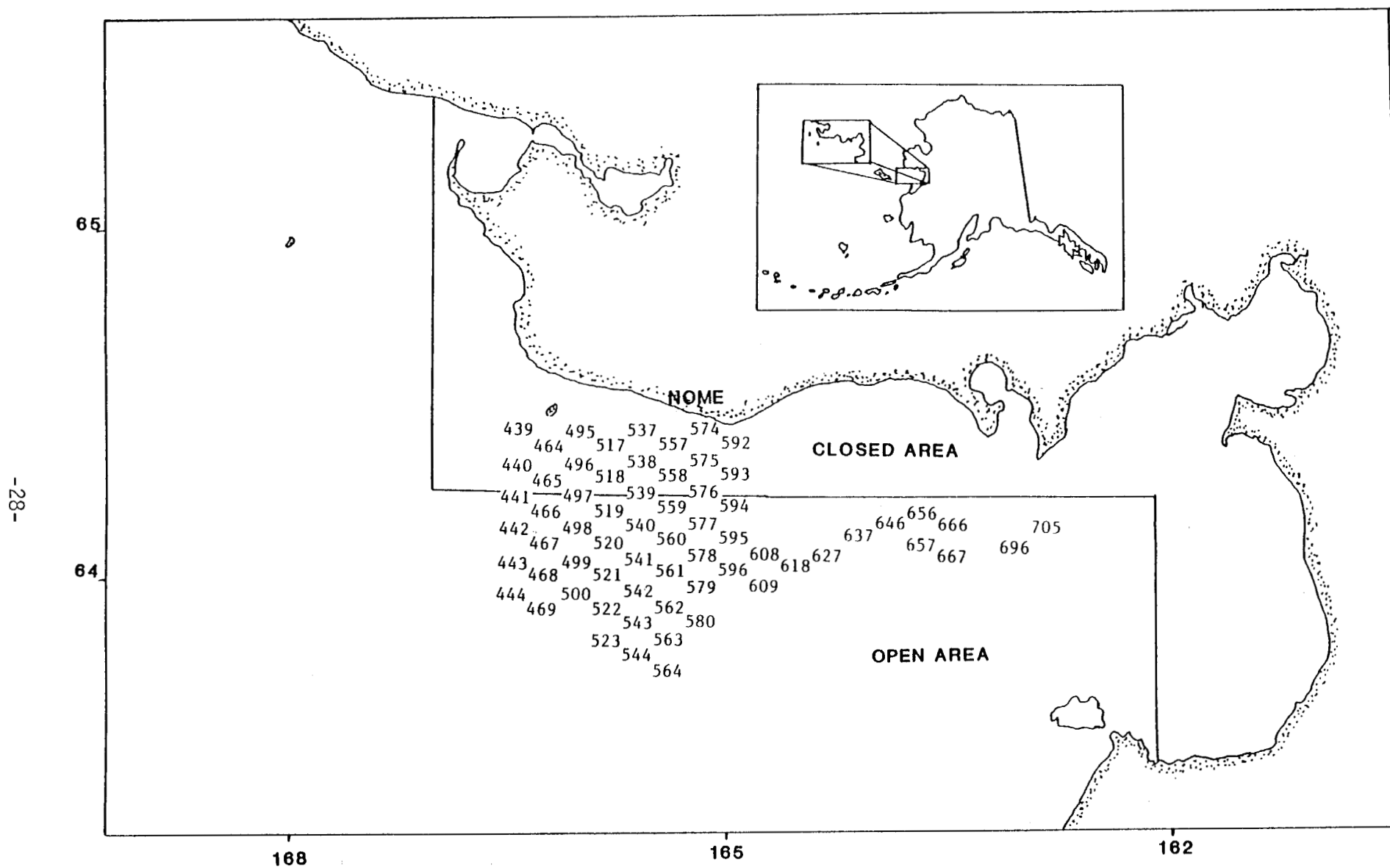
Figure 6. Station numbers designating the locations fished during the 1985 ADF&G red king crab population assessment survey in Norton Sound. A line has been drawn to separate the areas open and closed to the summer commercial fishery.
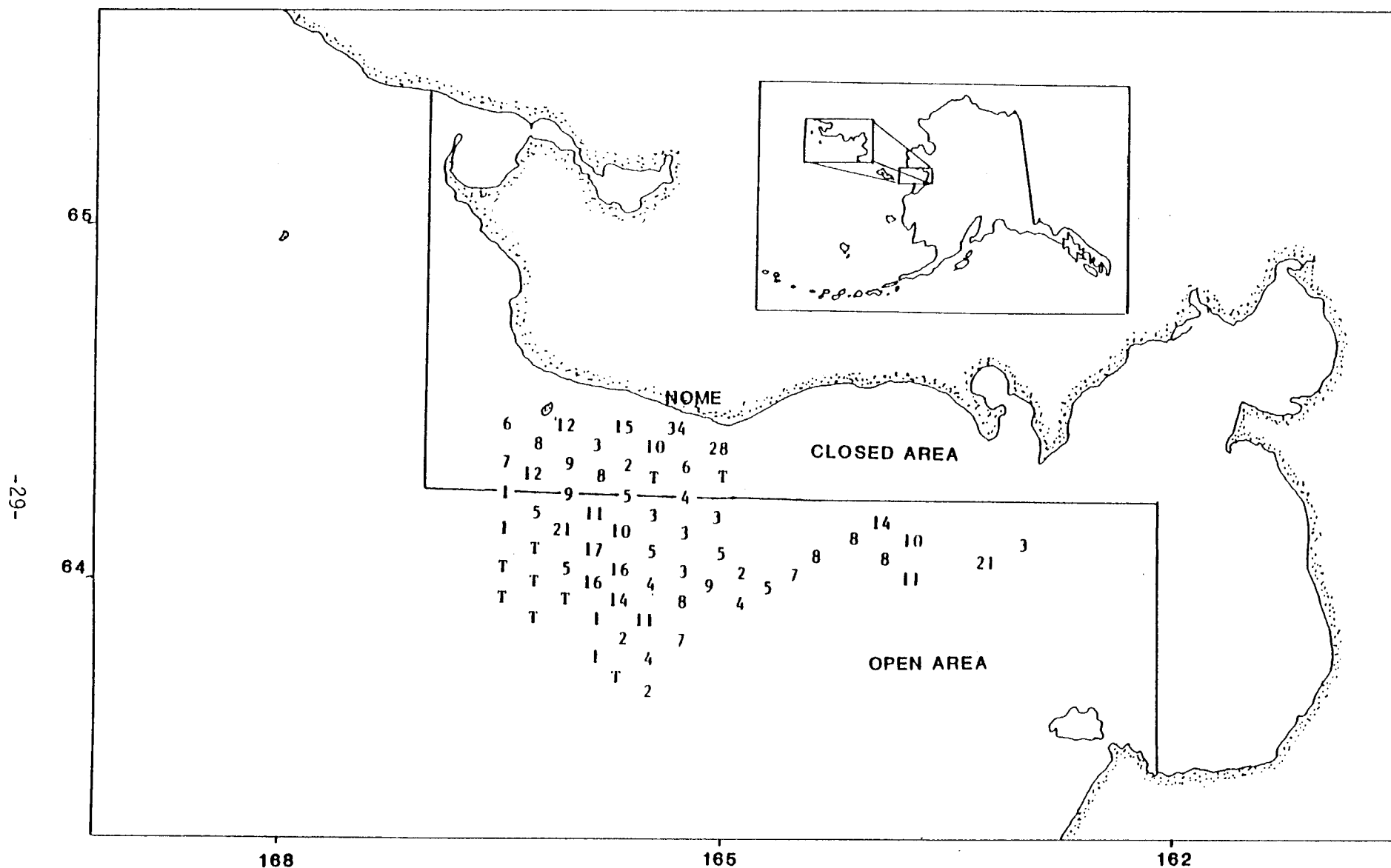
Figure 7. Catch in number of legal male king crab per pot for stations fished during the 1985 ADF&G population assessment survey in Norton Sound. A line has been drawn to separate the areas open and closed to the summer commercial fishery. The letter T represents less than one crab per pot for that station.
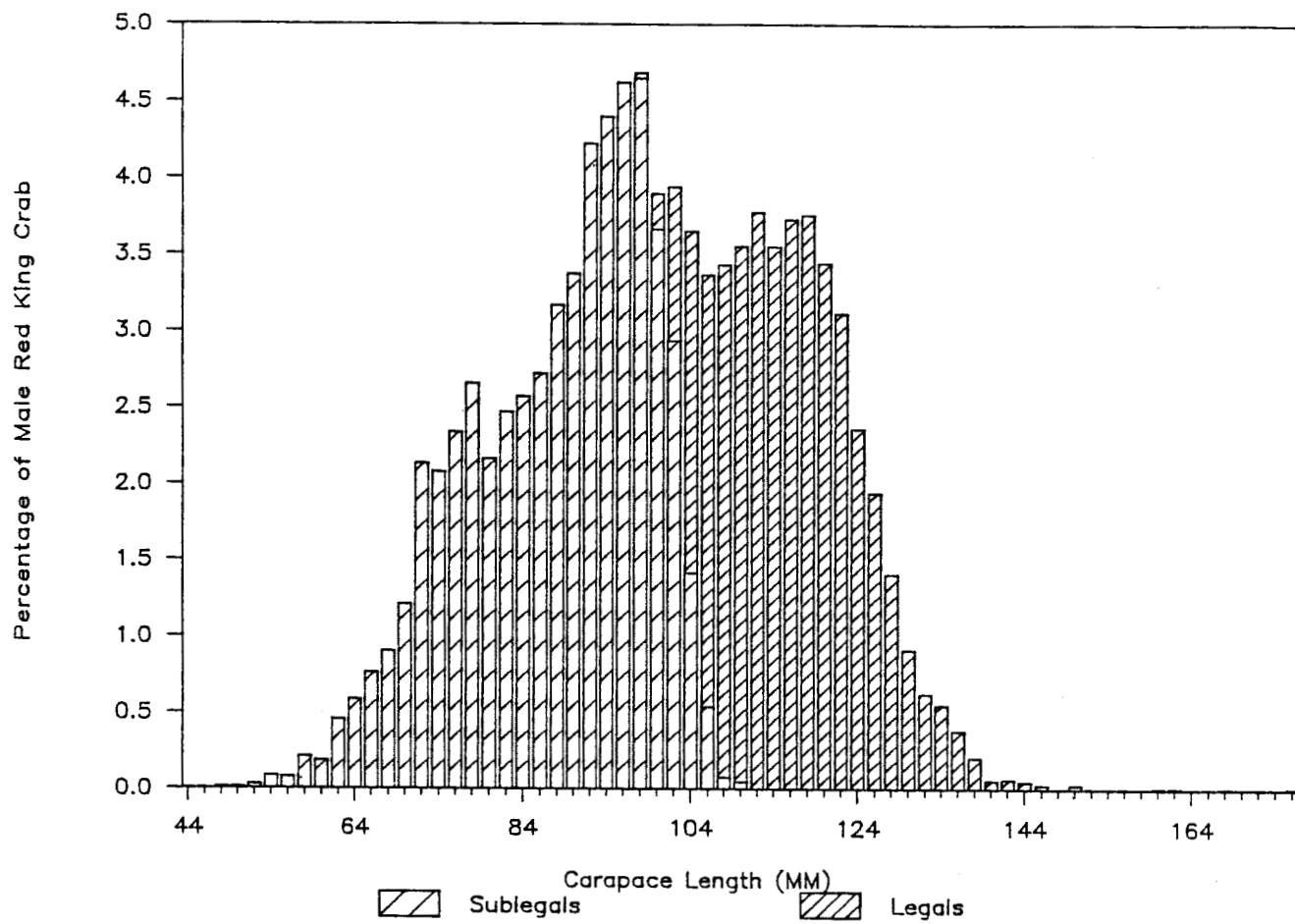
Figure 8. Histograms of carapace lengths of male red king crab captured during the population assessment survey in Norton Sound, July 1985.
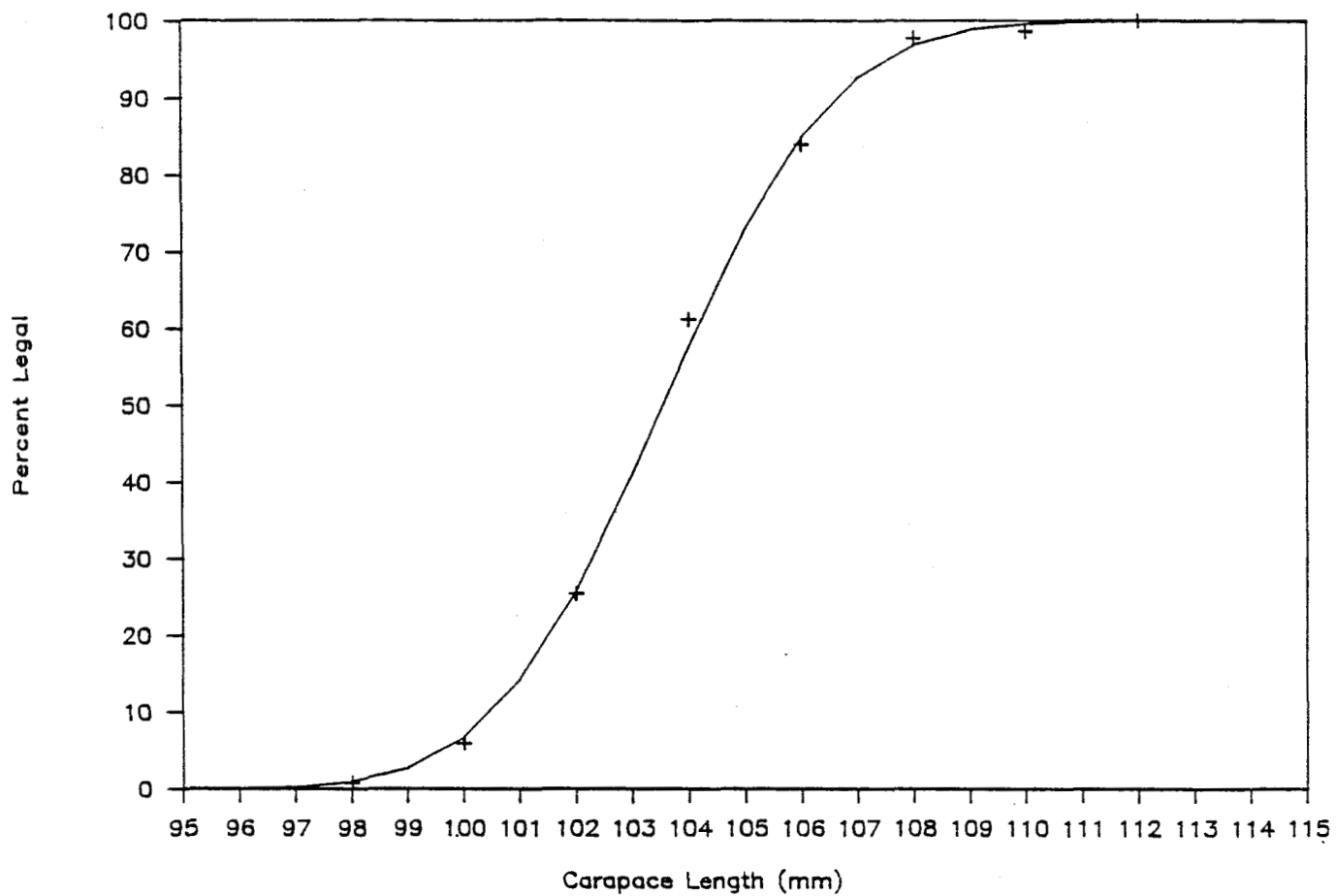
Figure 9. Probit fit for percentage of legal width male red king crab at each
1-mm carapace length increment for 1985 Norton Sound survey data.
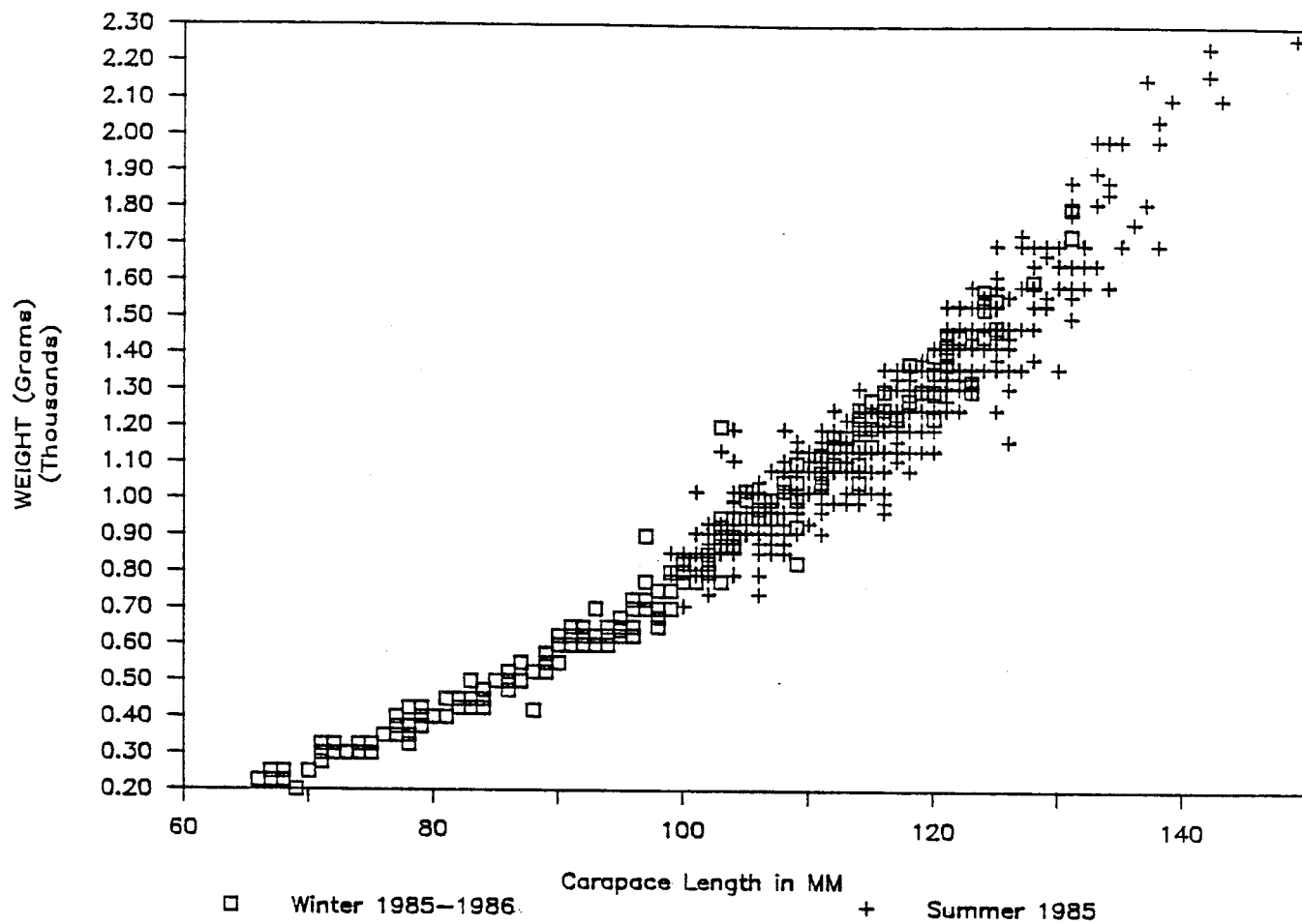
Figure 10. Weight of male red king crab by 1-mm carapace length increments for Norton Sound.
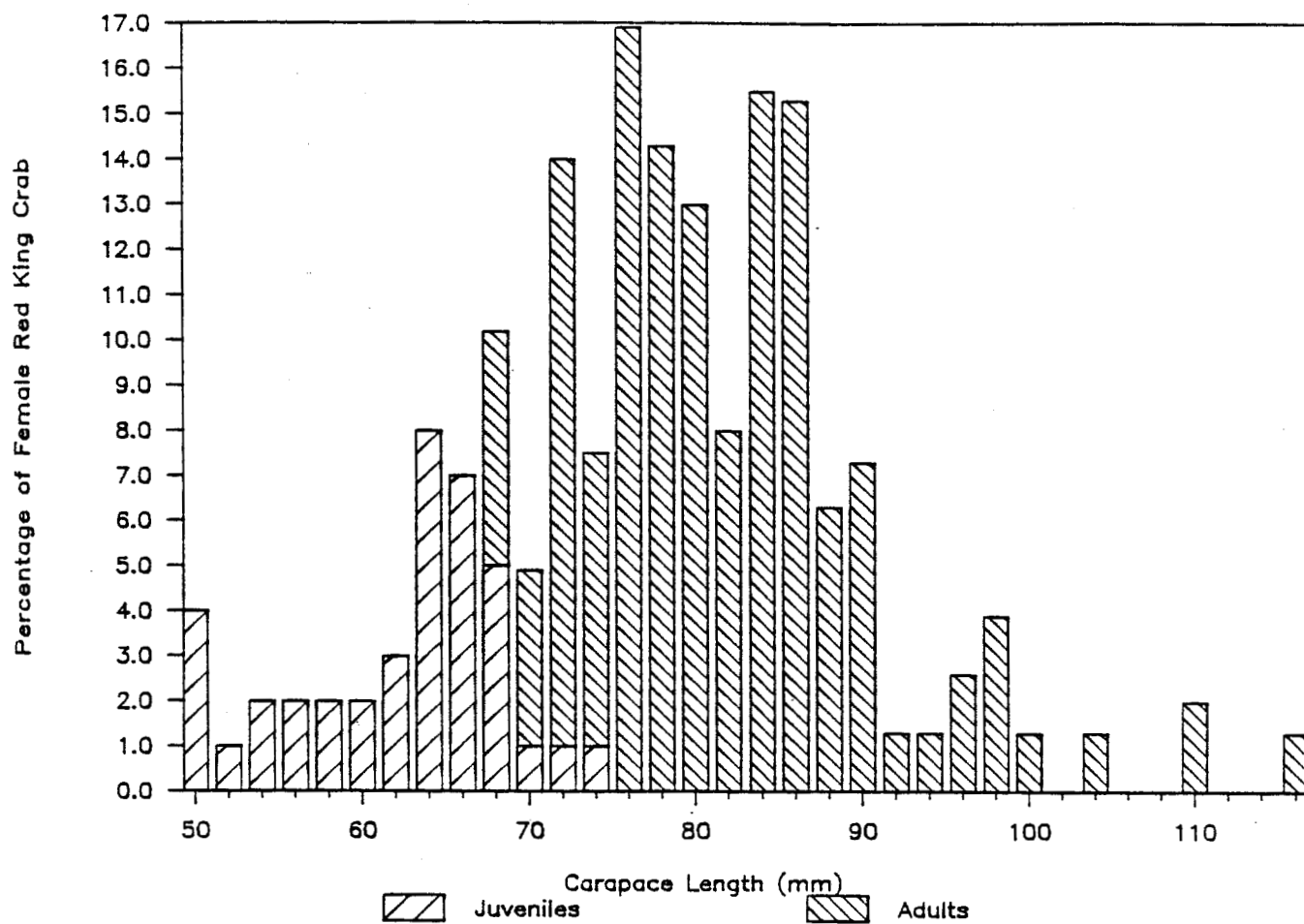
Figure 11. Histograms of carapace lengths of female red king crab captured during the population assessment survey in Norton Sound, July 1985.
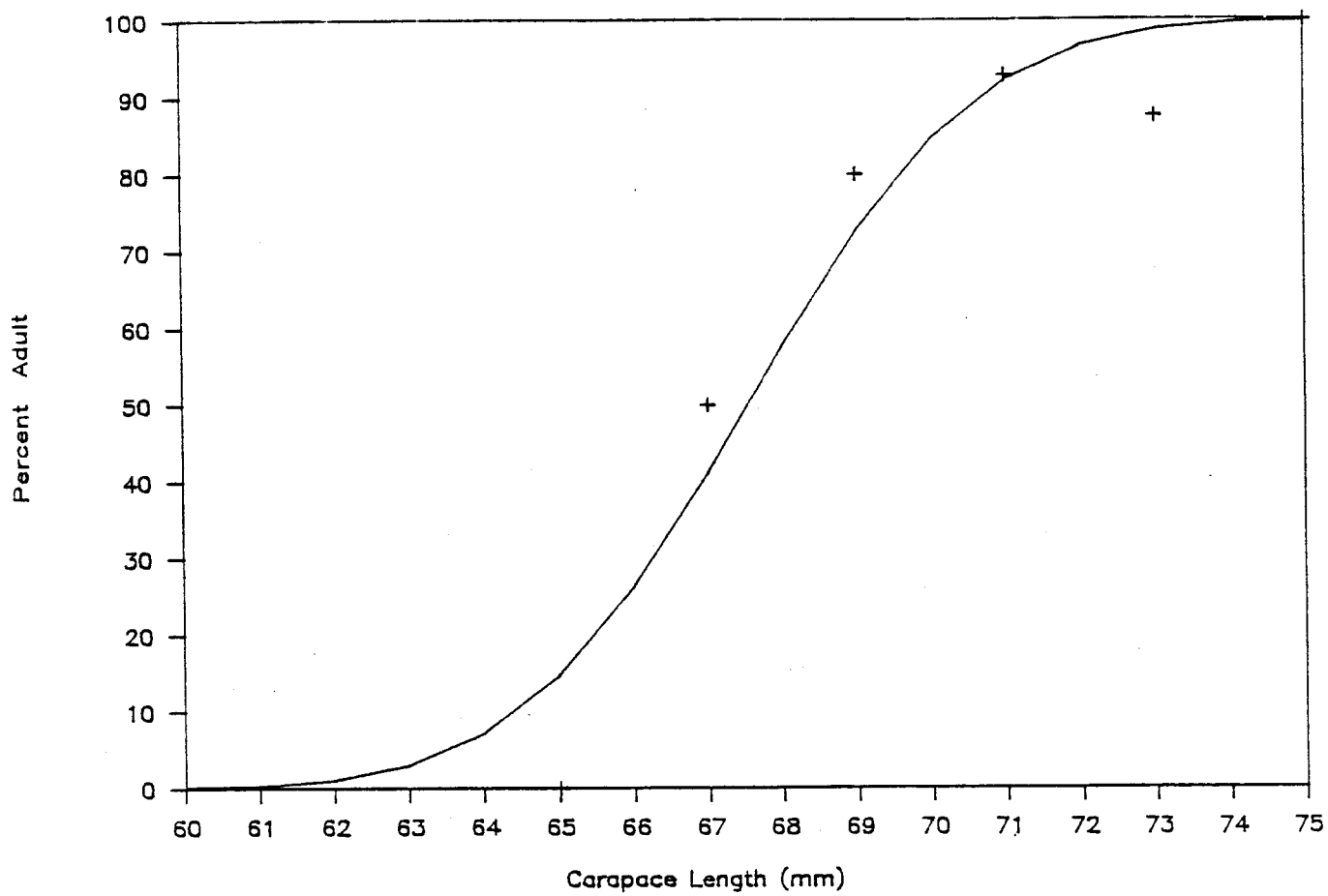
Figure 12. Probit fit for percentage adult female king crab at each 1-mm cara-
pace length increment for 1985 Norton Sound survey data.
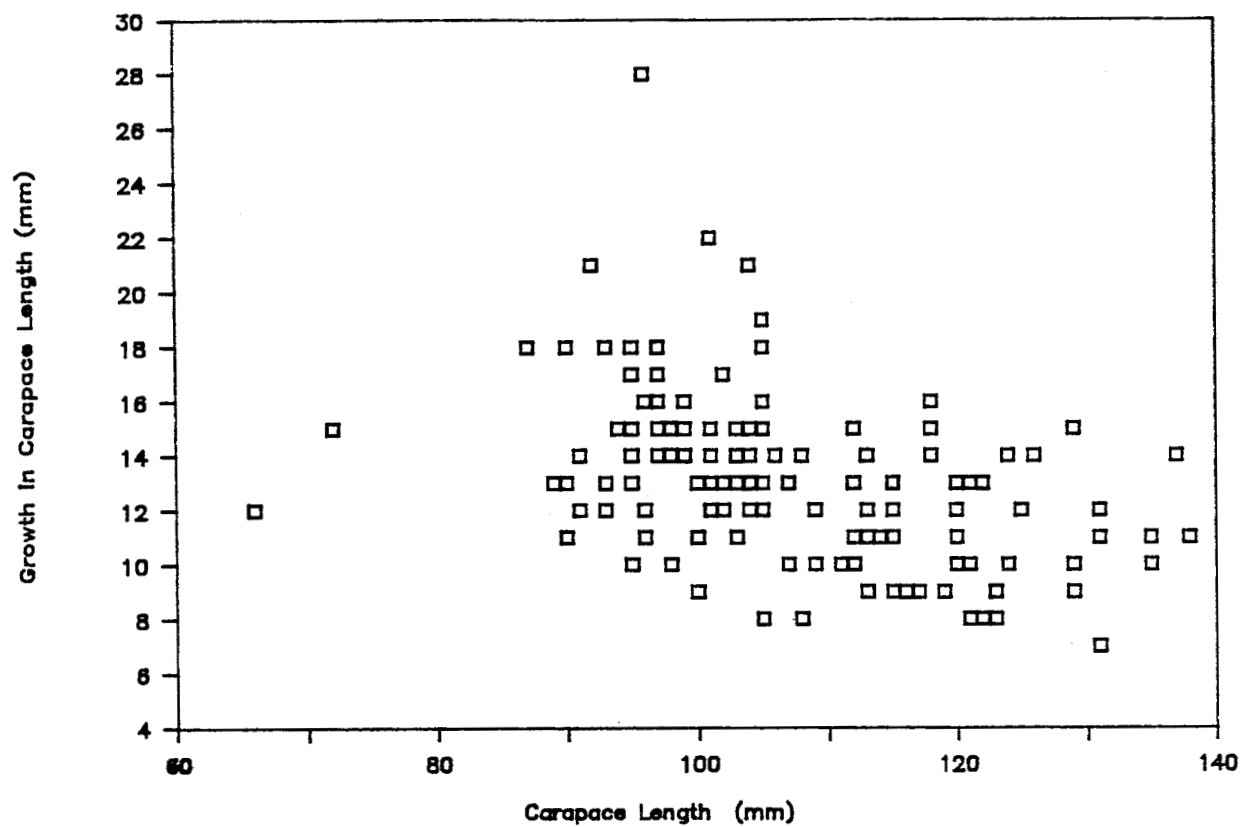
Figure 13. Growth in carapace length for tagged male red king crab recpatured after a single molting period in Norton Sound, 1980 through 1986.

APPENDICES

Appendix Table 1. Catch in numbers of legal male red king crab per station
from ADF&G population assessment surveys in Norton Sound,
1980-1982. A blank indicates that the station was not
fished and a zero indicates that it was fished but catch
was zero[1].

	Catch of Legal Male Red King Crab				
Station	1980	1981	1982	Mean (80-82)	STD [2]
322		0		0.0	
323		0		0.0	
354		1		1.0	
355		0		0.0	
386		1		1.0	
391		1		1.0	
392		4		4.0	
413			4	4.0	
414			4	4.0	
415		3		3.0	
416		5		5.0	
418	7			7.0	
420		0		0.0	
421		0		0.0	
439			52	52.0	
440	122		5	63.5	82.7
441		9	7	8.0	1.4
442		4		4.0	
443	38	6	1	15.0	20.1
444	73	4	0	25.7	41.0
447		1		1.0	
464	83		63	73.0	14.1
465	151	74	6	77.0	72.5
466		9	13	11.0	2.8
467	163	14	1	59.3	90.0
468	149	4	1	51.3	84.6
469	117	1	0	39.3	67.3
470		0		0.0	
480		1		1.0	
481		4		4.0	
495	13		60	36.5	33.2
496	386	417	102	301.7	173.6
497	67	177	21	88.3	80.2
498	124	63	7	64.7	58.5
499	119	44	6	56.3	57.5
500	161	22	3	62.0	86.3
501			1	1.0	
502		4		4.0	
503		0		0.0	
516	0			0.0	
517	107		142	124.5	24.7
518	107		73	90.0	24.0
519	141	137	34	104.0	60.7
520	234	155	19	136.0	108.8
521	277	181	10	156.0	135.2
522	149	140	3	97.3	81.8
523		95		95.0	
537	8		24	16.0	11.3
538	170	82	113	121.7	44.6
539	72	48	177	99.0	68.6
540	283	111	49	147.7	121.2
541	134	136	16	95.3	68.7
542		120	7	63.5	79.9
543		212	6	109.0	145.7
544		66		66.0	
545		64		64.0	
557	7		48	27.5	29.0
558	69	4	97	56.7	47.7
559	23		81	52.0	41.0

-Continued-

Appendix Table 1. Catch in numbers of legal male red king crab per station from ADF&G population assessment surveys in Norton Sound, 1980-1982. A blank indicates that the station was not fished and a zero indicates that it was fished but catch was zero[1] (continued).

| | Catch of Legal Male Red King Crab | | | | |
Station	1980	1981	1982	Mean (80-82)	STD[2]
560	97	19	28	48.0	42.7
561	161	34	30	75.0	74.5
562		56	19	37.5	26.2
563		113	7	60.0	75.0
564		92		92.0	
574	0			0.0	
575	9	26	46	27.0	18.5
576	31	13	50	31.3	18.5
577		16	33	24.5	12.0
578	44	7	61	37.3	27.6
579		20	52	36.0	22.6
592	1			1.0	
594		10	29	19.5	13.4
595		70	7	38.5	44.5
596	43	9	37	29.7	18.1
597		3		3.0	
605		17		17.0	
607			13	13.0	
608			26	26.0	
618	79	21	17	39.0	34.7
627		20	8	14.0	8.5
628			3	3.0	
637		46	15	30.5	21.9
638			0	0.0	
646		48	9	28.5	27.6
647		3		3.0	
656			13	13.0	
657		41	48	44.5	4.9
666		6	5	5.5	0.7
667		47	8	27.5	27.6
678			7	7.0	
686		1		1.0	
687		4		4.0	
688			8	8.0	
695		0		0.0	
696		59	26	42.5	23.3
697			5	5.0	
705		68	54	61.0	9.9
720			2	2.0	
728			1	1.0	
729			3	3.0	
737			3	3.0	
738			4	4.0	
Total Catch	4019	3293	1933	3817.2	1058.9
Stations 102	39	73	70		

[1]Source = Worksheet CTCHBYST.WK1 1980 and 1981 from Powell et al. 1983. 1982 from ADF&G 1982.

[2]STD = Standard deviation. If a station was fished only one year, calculation of a STD is not possible.

Appendix Table 2. The number of pots fished at each station for ADF&G population assessment surveys conducted in Norton Sound, 1980-1982[1].

Station	Number of Pots Fished			Station	Number of Pots Fished		
	1980	1981	1982		1980	1981	1982
322		10		541	10	10	9
323		10		542		10	10
354		9		543		10	9
355		10		544		10	
386		10		545		9	
391		10		557	10		10
392		10		558	10	10	10
413			10	559	10		10
414			10	560	10	10	10
415		10		561	9	10	10
416		10		562		10	10
418	13			563		10	10
420		10		564		10	
421		10		574	10		
439			10	575	10	10	10
440	10		10	576	10	9	10
441		10	10	577		10	10
442		10		578	10	10	10
443	10	10	9	579		10	10
444	13	10	10	592	10		
447		9		594		10	10
464	10		10	595		10	9
465	10	10	10	596	10	10	10
466		10	10	597		9	
467	10	10	10	605		10	
468	10	10	10	607			10
469	13	8	9	608			10
470		9		618	10	10	10
480		10		627		10	10
481		10		628			9
495	10		10	637		10	10
496	10	10	10	638			10
497	10	9	10	646		10	10
498	10	10	10	647		10	
499	10	10	10	656			10
500	9	10	10	657		10	10
501			10	666		9	9
502		10		667		10	10
503		10		678			10
516	10			686		9	
517	10		10	687		10	
518	10		9	688			10
519	10	10	10	695		10	
520	10	10	9	696		10	10
521	10	10	10	697			9
522	10	10	10	705		10	10
523		9		720			9
537	10		10	728			10
538	10	10	10	729			10
539	10	10	10	737			10
540	10	10	10	738			10
				Total Number of Pots	397	718	689
				Total Number of Stations 102	39	73	70

[1]Source = Worksheet CTCHBYST.WK1 1980 and 1981 data from Powell et al. 1983 and 1982 data from ADF&G 1982.

Appendix Table 3. Location of the stations considered for sampling during 1985 Norton Sound red king crab population assessment survey.

Stat-	Loran Location						Latitude/Longitude		Stat	Pri-
ion No.	West			East			East	West	Area	ority
439	X 17876.70	Y 29573.12	Z 47423.92	X 17871.22	Y 297573.89	Z 47435.14	64°27'/166°28'	64°27'/166°32'	666402	
440	X 17889.38	Y 29645.33	Z 47436.25	X 17883.89	Y 29646.37	Z 47447.59	64°21'/166°28'	64°21'/166°32'	666402	High
441	X 17902.17	Y 29717.65	Z 47448.76	X 17896.67	Y 29718.92	Z 47460.24	64°15'/166°28'	64°15'/166°32'	666402	High
442	X 17915.07	Y 29790.04	Z 47461.47	X 17909.56	Y 29791.51	Z 47473.09	64°09'/166°28'	64°09'/166°32'	666401	
443	X 17928.08	Y 29862.48	Z 47474.38	X 17922.55	Y 29864.12	Z 47486.13	64°03'/166°28'	64°03'/166°32'	666401	High
444	X 17941.19	Y 29934.94	Z 47487.49	X 17935.65	Y 29936.74	Z 47499.38	63°57'/166°28'	63°57'/166°32	666330	High
445	X 17954.40	Y 30007.40	Z 47500.81	X 17948.86	Y 30009.35	Z 47512.84	63°51'/166°28'	63°51'/166°32'	666330	
446	X 17967.73	Y 30079.87	Z 47514.33	X 17962.17	Y 30081.95	Z 47526.50	63°45'/166°28'	63°45'/166°32'	666330	
464	X 17899.26	Y 29608.16	Z 47396.05	X 17893.88	Y 29608.24	Z 47407.42	64°24'/166°16'	64°24'/166°20'	666402	High
465	X 17912.04	Y 29679.50	Z 47408.07	X 17906.65	Y 29679.91	Z 47419.57	64°18'/166°16'	64°18'/166°20'	666402	High
466	X 17924.92	Y 29751.07	Z 47420.27	X 17919.52	Y 29751.77	Z 47431.91	64°12'/166°16'	64°12'/166°20'	666401	High
467	X 17937.90	Y 29822.79	Z 47432.67	X 17932.49	Y 29823.75	Z 47444.45	64°06'/166°16'	64°06'/166°20'	666401	High
468	X 17950.99	Y 29894.63	Z 47445.26	X 17945.57	Y 29895.80	Z 47457.18	64°00'/166°16'	64°00'/166°20'	666401	High
469	X 17964.18	Y 29966.53	Z 47458.04	X 17958.75	Y 29967.91	Z 47470.10	63°54'/166°16'	63°54'/166°20'	666330	High
470	X 17977.47	Y 30038.50	Z 47471.03	X 17972.04	Y 30040.06	Z 47483.23	63°48'/166°16'	63°48'/166°20'	666330	
495	X 17908.81	Y 29574.54	Z 47356.06	X 17903.54	Y 29573.64	Z 47367.44	64°27'/166°04'	64°27'/166°08'	666402	High
496	X 17921.57	Y 29644.49	Z 47367.57	X 17916.30	Y 29644.02	Z 47379.09	64°21'/166°04'	64°21'/166°08'	666402	High
497	X 17934.44	Y 29714.89	Z 47379.27	X 17929.15	Y 29714.80	Z 47390.92	64°15'/166°04'	64°15'/166°08'	666402	High
498	X 17947.40	Y 29785.61	Z 47391.15	X 17942.10	Y 29785.85	Z 47402.94	64°09'/166°04'	64°09'/166°08'	666401	High
499	X 17960.46	Y 29856.59	Z 47403.21	X 17955.15	Y 29857.11	Z 47415.15	64°03'/166°04'	64°03'/166°08'	666401	High
500	X 17973.62	Y 29927.73	Z 47415.47	X 17968.31	Y 29928.51	Z 47427.55	63°57'/166°04'	63°57'/166°08'	666330	High
501	X 17986.88	Y 29999.01	Z 47427.92	X 17981.56	Y 30000.02	Z 47440.15	63°51'/166°04'	63°51'/166°08'	666330	
502	X 18000.24	Y 30070.38	Z 47440.56	X 17994.92	Y 30071.61	Z 47452.94	63°45'/166°04'	63°45'/166°08'	666330	
517	X 17929.51	Y 29612.47	Z 47330.17	X 17924.33	Y 29611.18	Z 47341.69	64°24'/165°53'	64°24'/165°57'	656402	High
518	X 17942.35	Y 29681.46	Z 47341.39	X 17937.16	Y 29680.62	Z 47353.05	64°18'/165°53'	64°18'/165°57'	656402	High

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-Continued-

Appendix Table 3. Location of the stations considered for sampling during 1985 Norton Sound red king crab population assessment survey (continued).

Station No.	Loran Location						Latitude/Longitude		Stat Area	Priority
	West			East			East	West		
579	X 18032.07	Y 29929.35	Z 47274.36	X 18027.18	Y 29928.52	Z 47286.78	63°57'/165°18'	63°57'/165°22'	656330	High
580	X 18045.33	Y 29997.22	Z 47285.07	X 18040.44	Y 29996.73	Z 47297.64	63°51'/165°18'	63°51'/165°22'	656330	
581	X 18058.68	Y 30065.47	Z 47295.94	X 18053.80	Y 30065.28	Z 47308.67	63°45'/165°18'	63°45'/165°22'	656330	
592	X 17986.71	Y 29639.59	Z 47195.83	X 17981.91	Y 29636.52	Z 47207.63	64°24'/165°07'	64°24'/165°11'	656402	
593	X 17999.59	Y 29702.98	Z 47205.39	X 17994.79	Y 29700.40	Z 47217.34	64°18'/165°07'	64°18'/165°11'	656402	
594	X 18012.56	Y 29767.47	Z 47215.10	X 18007.76	Y 29765.34	Z 47227.21	64°12'/165°07'	64°12'/165°11'	656401	High
595	X 18025.61	Y 29832.84	Z 47224.97	X 18020.81	Y 29831.13	Z 47237.23	64°06'/165°07'	64°06'/165°11'	656401	High
596	X 18038.74	Y 29898.94	Z 47235.00	X 18033.95	Y 29897.61	Z 47247.41	64°00'/165°07'	64°00'/165°11'	656401	High
597	X 18051.96	Y 29965.62	Z 47245.19	X 18047.16	Y 29964.66	Z 47257.76	63°54'/165°07'	63°54'/165°11'	656330	
598	X 18065.25	Y 30032.78	Z 47255.54	X 18060.46	Y 30032.16	Z 47268.27	63°48'/165°07'	63°48'/165°11'	656330	
618	X 18066.80	Y 29908.91	Z 47160.00	X 18062.21	Y 29907.02	Z 47172.56	64°00'/164°43'	64°00'/164°47'	646401	
627	X 18074.95	Y 29884.20	Z 47114.73	X 18070.46	Y 29881.89	Z 47127.28	64°03'/164°30'	64°03'/164°34'	646401	
637	X 18079.50	Y 29859.63	Z 47079.19	X 18075.09	Y 29856.96	Z 47091.71	64°06'/164°20'	64°06'/164°24'	646401	
646	X 18086.05	Y 29838.13	Z 47037.71	X 18081.73	Y 29835.12	Z 47050.21	64°09'/164°08'	64°09'/164°12'	646401	
647	X 18099.04	Y 29898.03	Z 47045.32	X 18094.73	Y 29895.40	Z 47057.99	64°03'/164°08'	64°03'/164°12'	646401	
657	X 18105.28	Y 29876.69	Z 47003.65	X 18101.07	Y 29873.74	Z 47016.28	64°06'/163°56'	64°06'/164°00'	636401	High
666	X 18111.30	Y 29857.03	Z 46962.34	X 18107.17	Y 29853.80	Z 46974.94	64°09'/163°44'	64°09'/163°48'	636401	High
667	X 18124.21	Y 29914.75	Z 46968.96	X 18120.10	Y 29911.87	Z 46981.73	64°03'/163°44'	64°03'/163°48'	636401	High
678	X 18141.83	Y 29951.60	Z 46936.88	X 18137.81	Y 29948.81	Z 46949.78	64°00'/163°33'	64°00'/163°37'	636401	
687	X 18134.46	Y 29876.07	Z 46889.57	X 18130.51	Y 29872.71	Z 46902.26	64°09'/163°21'	64°09'/163°25'	636401	
688	X 18147.29	Y 29931.84	Z 46895.23	X 18143.35	Y 29928.81	Z 46908.08	64°03'/163°21'	64°03'/163°25'	636401	
695	X 18139.79	Y 29859.23	Z 46848.87	X 18135.91	Y 29855.68	Z 46861.52	64°12'/163°09'	64°12'/163°13'	636401	
696	X 18152.54	Y 29913.49	Z 46853.98	X 18148.68	Y 29910.25	Z 46866.79	64°06'/163°09'	64°06'/163°13'	636401	High
697	X 18219.51	Y 30013.73	Z 46663.14	X 18161.49	Y 29965.91	Z 46872.16	64°00'/163°09'	64°00'/163°13'	636401	
705	X 18157.59	Y 29896.46	Z 46813.15	X 18142.29	Y 29882.82	Z 46864.14	64°09'/162°57'	64°09'/163°01'	626401	High

-Continued-

Appendix Table 3. Location of the stations considered for sampling during 1985 Norton Sound red king crab population assessment survey (continued).

Stat-ion No.	Loran Location						Latitude/Longitude		Stat Area	Pri-ority
	West			East			East	West		
519	X 17955.28	Y 29751.00	Z 47352.79	X 17950.08	Y 29750.55	Z 47364.59	64° 12'/165° 53'	64° 12'/165° 57'	656401	High
520	X 17968.31	Y 29820.94	Z 47364.37	X 17963.11	Y 29820.83	Z 47376.32	64° 06'/165° 53'	64° 06'/165° 57'	656401	High
521	X 17981.44	Y 29891.19	Z 47376.13	X 17976.23	Y 29891.39	Z 47388.22	64° 00'/165° 53'	64° 00'/165° 57'	656401	High
522	X 17994.66	Y 29961.67	Z 47388.08	X 17989.45	Y 29962.15	Z 47400.32	63° 54'/165° 53'	63° 54'/165° 57'	656330	High
523	X 18007.98	Y 30032.33	Z 47400.21	X 18002.76	Y 30033.07	Z 47412.61	63° 48'/165° 53'	63° 48'/165° 57'	656330	
537	X 17938.46	Y 29584.08	Z 47290.10	X 17933.38	Y 29581.94	Z 47301.64	64° 27'/165° 41'	64° 27'/165° 45'	656402	High
538	X 17951.27	Y 29651.22	Z 47300.82	X 17946.19	Y 29649.59	Z 47312.49	64° 21'/165° 41'	64° 21'/165° 45'	656402	High
539	X 17964.17	Y 29719.17	Z 47311.70	X 17959.08	Y 29718.00	Z 47323.52	64° 15'/165° 41'	64° 15'/165° 45'	656402	High
540	X 17977.17	Y 29787.75	Z 47322.76	X 17972.08	Y 29786.98	Z 47334.72	64° 09'/165° 41'	64° 09'/165° 45'	656401	High
541	X 17990.26	Y 29856.81	Z 47333.99	X 17985.16	Y 29856.40	Z 47346.10	64° 03'/165° 41'	64° 03'/165° 45'	656401	High
542	X 18003.45	Y 29926.24	Z 47345.40	X 17998.35	Y 29926.15	Z 47357.65	63° 57'/165° 41'	63° 57'/165° 45'	656330	High
543	X 18016.72	Y 29995.97	Z 47356.98	X 18011.62	Y 29996.18	Z 47369.39	63° 51'/165° 41'	63° 51'/165° 45'	656330	High
544	X 18030.08	Y 30065.91	Z 47368.76	X 18024.98	Y 30066.39	Z 47381.32	63° 45'/165° 41'	63° 45'/165° 45'	656330	
557	X 17958.65	Y 29623.56	Z 47263.40	X 17953.66	Y 29621.23	Z 47275.07	64° 24'/165° 30'	64° 24'/165° 34'	656402	High
558	X 17971.53	Y 29689.79	Z 47273.81	X 17966.53	Y 29687.95	Z 47285.62	64° 18'/165° 30'	64° 18'/165° 34'	656402	High
559	X 17984.49	Y 29756.87	Z 47284.37	X 17979.49	Y 29755.48	Z 47296.34	64° 12'/165° 30'	64° 12'/165° 34'	656401	High
560	X 17997.54	Y 29824.62	Z 47295.11	X 17992.54	Y 29823.63	Z 47307.22	64° 06'/165° 30'	64° 06'/165° 34'	656401	High
561	X 18010.68	Y 29892.90	Z 47306.02	X 18005.68	Y 29892.27	Z 47318.28	64° 00'/165° 30'	64° 00'/165° 34'	656401	High
562	X 18023.91	Y 29961.60	Z 47317.10	X 18018.91	Y 29961.30	Z 47329.51	63° 54'/165° 30'	63° 54'/165° 34'	656330	High
563	X 18037.22	Y 30030.62	Z 47328.36	X 18032.23	Y 30030.62	Z 47340.93	63° 48'/165° 30'	63° 48'/165° 34'	656330	High
574	X 17929.55	Y 29580.46	Z 47310.27	X 17962.13	Y 29596.47	Z 47234.99	64° 27'/165° 18'	64° 27'/165° 22'	656402	High
575	X 17979.85	Y 29663.65	Z 47233.21	X 17974.96	Y 29661.15	Z 47245.02	64° 21'/165° 18'	64° 21'/165° 22'	656402	High
576	X 17992.78	Y 29728.91	Z 47243.25	X 17987.88	Y 29726.88	Z 47255.22	64° 15'/165° 18'	64° 15'/165° 22'	656402	High
577	X 18005.79	Y 29795.06	Z 47253.46	X 18000.90	Y 29793.47	Z 47265.57	64° 09'/165° 18'	64° 09'/165° 22'	656401	
578	X 18018.89	Y 29861.92	Z 47263.83	X 18013.99	Y 29860.72	Z 47276.09	54° 03'/165° 18'	64° 03'/165° 22'	656401	High

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Appendix Table 4.   Catch in numbers of male red king crab y station from the
                    1985 ADF&G population assessment survey in Norton Sound.
                    Catches are standardized to a 24-hour soak period[1].

Station	Number of Pots	Prerecruits (Sublegal)[2]			Legal[3]			Total Male Crab
		Pre-ones	Ones	Total	Recruits	P.Recruits	Total	
439	10	208	62	270	27	36	63	333
440	8	134	48	182	20	42	62	244
441	9	6	3	9	2	4	6	15
442	10	2	5	7	3	2	5	12
443	10	2	0	2	0	0	0	2
444	10	0	0	0	0	0	0	0
464	10	223	89	312	37	42	79	391
465	8	123	82	205	48	49	97	302
466	10	14	7	21	15	22	37	58
467	10	0	2	2	2	2	4	6
468	10	2	2	4	0	2	2	6
469	10	0	0	0	0	1	1	1
495	10	113	102	215	55	64	119	334
496	10	220	96	316	35	41	76	392
497	10	136	122	258	47	48	95	353
498	10	36	75	111	88	121	209	320
499	10	4	6	10	8	42	50	60
500	10	0	0	0	1	1	2	2
517	10	32	37	69	20	13	33	102
518	10	129	73	202	38	45	83	285
519	10	122	106	228	53	60	113	341
520	10	241	228	469	76	97	173	642
521	10	20	49	69	58	101	159	228
522	10	0	1	1	6	9	15	16
523	10	1	0	1	0	3	3	4
537	10	134	101	235	67	87	154	389
538	10	11	22	33	4	13	17	50
539	10	29	60	89	23	30	53	142
540	10	33	66	99	46	58	104	203
541	10	85	163	248	84	79	163	411
542	10	14	41	55	51	89	140	195
543	10	1	5	6	8	15	23	29
544	10	1	3	4	3	2	5	9
557	9	47	66	113	37	54	91	204
558	10	5	8	13	0	3	3	16
559	10	25	16	41	21	12	33	74
560	10	30	36	66	18	28	46	112
561	10	14	39	53	14	22	36	89
562	10	23	54	77	56	56	112	189
563	10	2	6	8	10	32	42	50
564	10	0	1	1	9	8	17	18
574	10	182	260	442	172	166	338	780
575	10	18	28	46	16	40	56	102
576	10	15	25	40	13	19	32	72
577	10	6	12	18	11	17	28	46
578	10	5	9	14	13	17	30	44
579	10	6	41	47	37	39	76	123
580	9	1	30	31	26	46	72	103
592	10	212	227	439	119	155	274	713
593	10	1	3	4	2	3	5	9
594	9	22	19	41	8	15	23	64
595	10	7	17	24	21	28	49	73
596	10	18	32	50	39	48	87	137
608	10	2	17	19	16	35	51	70
609	10	4	28	32	17	27	44	76
618	10	7	13	20	14	40	54	74
627	10	24	16	40	23	43	66	106
637	10	26	31	57	21	56	77	134
646	10	14	27	41	40	43	83	124
656	10	54	105	159	71	74	145	304
657	10	31	39	70	29	51	80	150
666	10	56	40	96	52	53	105	201
667	10	30	34	64	60	53	113	177
696	10	72	104	176	80	123	203	379
705	10	7	5	12	13	16	29	41
Total 65	642	3042	3044	6086	2003	2642	4645	10731

[1] Source = R01-600K OF 1/27/86

[2] Sublegal or Prerecruits = male crab < 121 mm (4.75 in) in
carapace length. Ones = Sublegals > 90 mm in carapace length.
Pre-ones = Sublegals < 90 mm in carapace length

[3] Legal - Male crab > 121 mm (4.75 in) in carapace length
Recruits = Legals with new shells < 115 mm in carapace length.
Post-recruits = Legals > 115 mm in carapace length and all old
and very old shells.

Appendix Table 5. Catch in numbers of female red king crab by station from the 1985 ADF&G population assessment survey in Norton Sound. Catches are standardized to a 24-hour soak period[1].

Station	Number of Pots	Juvenile	Adult[2]	Total
439	10	7	1	8
440	8	0	0	0
441	9	0	0	0
442	10	0	0	0
443	10	0	0	0
444	10	0	0	0
464	10	1	6	7
465	8	0	0	0
466	10	2	0	2
467	10	0	0	0
468	10	0	0	0
469	10	0	0	0
495	10	11	4	15
496	10	9	11	20
497	10	0	2	2
498	10	0	0	0
499	10	0	0	0
500	10	0	0	0
517	10	1	0	1
518	10	0	9	9
519	10	0	8	8
520	10	0	4	4
521	10	0	0	0
522	10	0	0	0
523	10	0	0	0
537	10	0	5	5
538	10	0	0	0
539	10	2	2	4
540	10	0	2	2
541	10	0	0	0
542	10	0	0	0
543	10	0	3	3
544	10	0	0	0
557	9	0	5	5
558	10	0	0	0
559	10	0	0	0
560	10	0	1	1
561	10	0	0	0
562	10	0	0	0
563	10	0	0	0
564	10	0	0	0
574	10	4	13	17
575	10	0	1	1
576	10	0	2	2
577	10	0	0	0
578	10	0	0	0
579	10	0	3	3
580	9	0	0	0
592	10	1	3	4
593	10	0	0	0
594	9	0	0	0
595	10	0	0	0
596	10	0	2	2
608	10	0	0	0
609	10	0	0	0
618	10	0	0	0
627	10	0	4	4
637	10	0	1	1
646	10	0	1	1
656	10	0	14	14
657	10	1	6	7
666	10	0	7	7
667	10	0	1	1
696	10	1	20	21
705	10	0	0	0
Total	65	642	40	141	181

[1] Source = RO1-60FK of 6/5/86

[2] Juveniles were defined as small females without eggs and adults as those with eggs or of an extremely large size (> 85 mm in carapace length).

Appendix Table 6. Catch in numbers of blue king crab from the 1985 ADF&G
population assessment survey in Norton Sound. Catches
are standardized to a 24-hour soak period[1].

Station[2]	Number of Pots	Number of Blue King Crab		
		Females	Males	Total
439	10	13	11	24
440	8	6	6	12
441	9	1	2	3
442	10	3	0	3
443	10	5	2	7
466	10	0	2	2
468	10	2	0	2
469	10	1	0	1
499	10	0	1	1
Total 9	87	31	24	55

[1]Source. = R01-60FK of 6/5/86

[2]Only stations with catches of blue king crab are listed.

Appendix Table 7. Incidental catch in numbers of crab and finfish from the
1985 ADF&G population assessment survey in Norton Sound.
Catches are unstandardized[1].

Station	Number of Pots	Tanner Crab	Yellow Fin Sole	Starry Flounder	Saffron Cod
439	10	0	0	0	0
440	8	0	0	2	0
441	9	10	1	5	0
442	10	4	0	3	0
443	10	4	2	0	0
444	10	14	1	0	0
464	10	0	0	0	0
465	8	0	0	1	0
466	10	12	0	9	0
467	10	23	1	5	0
468	10	7	0	1	0
469	10	11	1	1	0
495	10	0	0	0	0
496	10	9	0	1	0
497	10	1	0	7	0
498	10	0	0	13	0
499	10	1	0	4	0
500	10	2	2	2	0
517	10	2	0	0	7
518	10	0	0	2	0
519	10	0	0	5	0
520	10	0	0	3	0
521	10	0	0	3	0
522	10	0	0	8	0
523	10	3	0	1	0
537	10	0	0	.1	0
538	10	0	0	2	3
539	10	0	0	0	0
540	10	0	3	11	0
541	10	0	0	27	0
542	10	0	0	40	0
543	10	1	1	55	0
544	10	1	1	21	0
557	9	0	1	0	0
558	10	11	0	0	2
559	10	2	3	8	0
560	10	0	3	34	0
561	10	0	3	31	1
562	10	0	0	22	0
563	10	0	0	36	0
564	10	0	0	35	0
574	10	0	0	0	0
575	10	1	0	0	1
576	10	0	0	0	0
577	10	1	17	2	0
578	10	0	5	30	0
579	10	0	0	20	0
580	9	0	0	33	0
592	10	1	0	0	0
593	10	0	1	1	0
594	9	0	0	12	0
595	10	0	0	22	0
596	10	0	2	15	0
608	10	9	7	31	0
609	10	0	0	14	0
618	10	7	1	12	0
627	10	23	4	19	0
637	10	5	0	13	0
646	10	15	0	19	0
656	10	1	1	5	0
657	10	15	1	1	0
666	10	2	1	4	0
667	10	1	1	10	0
696	10	1	2	0	1
705	10	0	1	0	0
Total	65	642	200	67	662	15

[1]Tanner crab are *C. opilio*. In addition catches of
hair crab, hermit crab, great sculpin, wolf fish,
sea brittle, and basket stars, tunicates, and sea
urchins were made.

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Appendix Table 8. Carapace length measurements (in mm) of male red king crab captured during the 1985 ADF&G population assessment survey in Norton Sound[1]. Carapace lengths have been categorized by shell condition and size.

Carapace Length(mm)	Numbers of Sublegals[2]			Number of Legals				Total Male	Percent Legal
	New Shell	Old Shell	Total	New Shell	Old Shell	Very Old Shell	Total		
0 - 44	0	0	0	0	0	0	0	0	0
45 - 46	0	0	0	0	0	0	0	0	0
47 - 48	1	0	1	0	0	0	0	1	0
49 - 50	1	0	1	0	0	0	0	1	0
51 - 52	3	0	3	0	0	0	0	3	0
53 - 54	9	0	9	0	0	0	0	9	0
55 - 56	8	0	8	0	0	0	0	8	0
57 - 58	23	0	23	0	0	0	0	23	0
59 - 60	20	0	20	0	0	0	0	20	0
61 - 62	49	0	49	0	0	0	0	49	0
63 - 64	63	0	63	0	0	0	0	63	0
65 - 66	82	0	82	0	0	0	0	82	0
67 - 68	97	0	97	0	0	0	0	97	0
69 - 70	130	0	130	0	0	0	0	130	0
71 - 72	229	0	229	0	0	0	0	229	0
73 - 74	223	0	223	0	0	0	0	223	0
75 - 76	251	0	251	0	0	0	0	251	0
77 - 78	285	0	285	0	0	0	0	285	0
79 - 80	232	0	232	0	0	0	0	232	0
81 - 82	265	0	265	0	0	0	0	265	0
83 - 84	276	0	276	0	0	0	0	276	0
85 - 86	292	0	292	0	0	0	0	292	0
87 - 88	340	0	340	0	0	0	0	340	0
89 - 90	362	0	362	0	0	0	0	362	0
91 - 92	453	0	453	0	0	0	0	453	0
93 - 94	472	0	472	0	0	0	0	472	0
95 - 96	496	0	496	0	0	0	0	496	0
97 - 98	492	7	499	4	0	0	4	503	1
99 -100	375	18	393	22	3	0	25	418	6
101 -102	307	8	315	101	7	0	108	423	26
103 -104	136	16	152	222	18	0	240	392	61
105 -106	49	9	58	245	58	0	303	361	84
107 -108	8	0	8	294	65	1	360	368	98
109 -110	4	1	5	308	68	0	376	381	99
111 -112	0	0	0	332	72	1	405	405	100
113 -114	0	0	0	315	66	0	381	381	100
115 -116	0	0	0	334	65	1	400	400	100
117 -118	0	0	0	349	52	2	403	403	100
119 -120	0	0	0	333	36	0	369	369	100
121 -122	0	0	0	293	40	1	334	334	100
123 -124	0	0	0	241	12	0	253	253	100
125 -126	0	0	0	193	14	1	208	208	100
127 -128	0	0	0	147	4	0	151	151	100
129 -130	0	0	0	93	5	0	98	98	100
131 -132	0	0	0	61	6	0	67	67	100
133 -134	0	0	0	55	4	0	59	59	100
135 -136	0	0	0	38	2	1	41	41	100
137 -138	0	0	0	21	1	0	22	22	100
139 -140	0	0	0	6	0	0	6	6	100
141 -142	0	0	0	7	0	0	7	7	100
143 -144	0	0	0	5	0	0	5	5	100
145 -146	0	0	0	3	0	0	3	3	100
147 -148	0	0	0	0	0	0	0	0	0
149 -150	0	0	0	3	0	0	3	3	100
151 -152	0	0	0	0	0	0	0	0	0
153 -154	0	0	0	0	0	0	0	0	0
155 -156	0	0	0	0	0	0	0	0	0
157 -158	0	0	0	0	0	0	0	0	0
159 -160	0	0	0	0	1	0	1	1	100
161 -162	0	0	0	0	1	0	1	1	100
163 -164	0	0	0	0	0	0	0	0	0
165 -166	0	0	0	0	0	0	0	0	0
167 -168	0	0	0	1	0	0	1	1	100
169 -170	0	0	0	0	0	0	0	0	0
171 -172	0	0	0	0	0	0	0	0	0
173 -174	0	0	0	0	0	0	0	0	0
175 -176	0	0	0	0	1	0	1	1	100
Total	6,033	59	6,092	4,026	601	8	4,635	10,727	

[1] Standardized for 24-hour soak, represents crab measured and not survey final. Source = RO1-5000, RKCMLENF.WK1 worksheet.

[2] No very old shell sublegals were caught.

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Appendix Table 9. Percentage legal male king crab for carapace lengths 95 to 112 mm, Norton Sound, 1985[1].

Carapace Length (mm)	Percent Legal in		
	1980	1981	1985 [2]
95	0.1	0.0	0.0
96	0.3	0.0	0.1
97	1.2	0.0	0.3
98	3.7	0.1	1.0
99	9.5	0.5	2.8
100	20.1	2.4	6.8
101	35.8	8.7	14.3
102	54.4	22.9	25.8
103	72.1	44.9	41.0
104	85.6	68.6	57.7
105	93.8	86.4	73.0
106	97.8	95.7	84.9
107	99.4	99.0	92.7
108	99.8	99.8	97.0
109	100.0	100.0	98.9
110	100.0	100.0	99.7
111	100.0	100.0	99.9
112	100.0	100.0	100.0

[1]Legal crab are males of at least 121 mm (4.75 in) in carapace width.

[2]Results of probit analysis did not suggest pooling data.

Appendix Table 10. Carapace length measurements (in mm) categorized by percent ovigerity of female red king crab captured during the 1985 ADF&G population assessment survey in Norton Sound[1].

Carapace Length (mm)	Number of Juveniles	Number of Adult Females By Relative Size of Egg Clutch (in Percent)						Total Females
		90	60-89	30-59	1-29	0	Total	
0 - 50	4	0	0	0	0	0	0	4
51 - 52	1	0	0	0	0	0	0	1
53 - 54	2	0	0	0	0	0	0	2
55 - 56	2	0	0	0	0	0	0	2
57 - 58	2	0	0	0	0	0	0	2
59 - 60	2	0	0	0	0	0	0	2
61 - 62	3	0	0	0	0	0	0	3
63 - 64	8	0	0	0	0	0	0	8
65 - 66	7	0	0	0	0	0	0	7
67 - 68	5	0	5	0	0	0	5	10
69 - 70	1	3	1	0	0	0	4	5
71 - 72	1	5	7	0	1	0	13	14
73 - 74	1	7	0	0	0	0	7	8
75 - 76	0	10	4	3	0	0	17	17
77 - 78	0	7	8	0	0	0	14	14
79 - 80	0	9	4	0	0	0	13	13
81 - 82	0	5	1	1	0	0	8	8
83 - 84	0	9	7	0	0	0	16	16
85 - 86	0	14	1	0	0	0	15	15
87 - 88	0	5	0	0	0	1	6	6
89 - 90	0	6	1	0	0	0	7	7
91 - 92	0	0	1	0	0	0	1	1
93 - 94	0	0	0	0	0	1	1	1
95 - 96	0	3	0	0	0	0	3	3
97 - 98	0	3	1	0	0	0	4	4
99 -100	0	1	0	0	0	0	1	1
101 -102	0	0	0	0	0	0	0	0
103 -104	0	1	0	0	0	0	1	1
105 -106	0	0	0	0	0	0	0	0
107 -108	0	0	0	0	0	0	0	0
109 -110	0	0	0	0	0	2	2	2
111 -112	0	0	0	0	0	0	0	0
113 -114	0	0	0	0	0	0	0	0
115 -116	0	0	0	0	0	1	1	1
Total	39	87	42	4	1	6	140	179

[1]Catches are standardized to a 24-hour soak but due to rounding differ from Appendix Table 5. Source = RO1-50FK, RKCFLENF.WK1 worksheet.

Appendix Table 11. Carapace length measurements (in mm) of blue king crab captured during the 1985 ADF&G population assessment survey in Norton Sound[1].

Carapace Length (mm)	Number of Blue King Crab		
	Female	Male	Total
89 - 90	3	3	6
91 - 92	3	0	3
93 - 94	0	0	0
95 - 96	0	1	1
97 - 98	1	1	2
99 -100	4	1	5
101 -102	4	1	5
103 -104	5	1	6
105 -106	1	1	2
107 -108	1	3	4
109 -110	0	0	0
111 -112	1	1	2
113 -114	3	3	6
115 -116	3	1	4
117 -118	0	0	0
119 -120	0	0	0
121 -122	1	1	2
123 -124	0	1	1
125 -126	0	1	1
127 -128	0	1	1
129 -130	0	0	0
131 -132	0	0	0
133 -134	0	0	0
135 -136	0	0	0
137 -138	0	0	0
139 -140	0	1	1
Total	30	22	52

[1]Standardized for 24-hour soak, any difference with Appendix Table 6 is due to rounding. Source = RO1-50FK and Ro1-500, BKCLENFR.WK1 worksheet.

Appendix Table 12. Carapace width measurements (in mm) of Tanner crab (*C. opilio*) captured during the 1985 ADF&G population assessment survey in Norton Sound[1].

Carapace Length (mm)	Number of Tanner Crab		
	Female	Male	Total
20			0
21	1		1
22	1	2	3
23		1	1
24	3		3
25	1	2	3
26	1	2	3
27	1	2	3
28			0
29			0
30			0
31			0
32			0
33			0
34			0
35			0
36			0
37			0
38			0
39	1		1
40		4	4
41	2		2
42		3	3
43	2	3	5
44	1		1
45	1	1	2
46	2	3	5
47			0
48	2	1	3
49	1		1
50	1	3	4
51	1	1	2
52		2	2
53		5	5
54		2	2
55	3	4	7
56	3	11	14
57	5	9	14
58	5	13	18
59	3	11	14
60	4	14	.18
61	2	11	13
62	2	4	6
63	1	5	6
64	1	4	5
65	1	6	7
66		5	5
67		2	2
68		3	3
69		2	2
70	1	3	4
71	1	1	2
72		2	2
73		2	2
74		3	3
75		1	1
76		1	1
77			0
78			0
79			0
80		1	1
81			0
82			0
83			0
84		2	2
85		2	2
86		2	2
Total	54	161	215

[1] Not standardized for a 24-hour soak, actual catch. Source = TCLENFR.WK1 worksheet.